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FARNBOROUGH REVIEW

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P.1067

THE HAWKER-SIDDELEY GROUP

About Aluminium... 8

THERMAL PROPERTIES

In this series of articles, some of the principal characteristics of aluminium and its structural alloys are briefly discussed for the interest of students and others.

Expansion

The dimensional change of aluminium and its alloys with change of temperature is roughly twice that of the ferrous metals, the average coefficient of linear expansion of commercially-pure metal, in the range 20—100° C, being 0.000024 (20—600° C: 0.0000285). That of the alloys is affected by the nature of their constituents: the presence of silicon and copper reduces expansion, and magnesium increases it.

This high expansion should be considered when aluminium is used with other materials, especially in a rigid structure. However, the stresses developed are moderated by the light metal's low elastic modulus, and there are countless examples of mixed construction, notably aircraft and other vehicles, in service in widely varying atmospheric temperatures. Only where dimensions are really great, as for example in a light alloy superstructure on a steel ship, or, in architecture, where large pieces of aluminium are set on a steel framework or in masonry, are slip-joints, plastic caulking, and other stress-relieving devices usually needed.

The outstanding instance of bi-metallic construction subjected to a severe temperature change is the aluminium internal combustion engine piston that works in an iron or steel cylinder. Here, where good fit is important, differential expansion is countered by the employment of low-expansion piston alloys, high-expansion iron cylinder linings, and such devices as split piston skirts and non-expanding struts cast into the piston, so as to permit very small "cold" clearances.

Another form of dimensional change, which does not directly affect the user of aluminium but is important in the production of castings, is the contraction of the metal on solidifying: linearly, this is 1 — 1.7% (comparative figures for iron, steel, and brass are, respectively, 1%, 2%, and 1.5%).

Thermal Conductivity

The quantity of heat that flows through a plate of commercially-pure aluminium 1 cm. thick is 0.52 calories/second/sq. cm. area/° C temperature difference between its faces (measured at 20° C; there is a small increase with temperature). This may be contrasted with 0.12 C.G.S. units for steel, and 0.92 C.G.S. units for copper.

Alloying, especially with manganese or magnesium, reduces thermal conductivity; in many structural alloys it lies between 0.3 and 0.5, while in an alloy containing 10% magnesium it may fall to 0.22. Although pure copper is more heat-conductive than aluminium, its engineering alloys, the brasses and bronzes, are generally inferior to the aluminium alloys in this respect.

The good heat transfer characteristics of aluminium are made use of in many fields, obvious examples being the cylinder-heads and pistons of internal combustion engines, and domestic pots and pans.

Specific & Latent Heats

The specific heat of aluminium (0.22 at normal temperatures) is higher than that of any common metal except magnesium (0.25), that of iron and steel being about 0.12, and of copper and brass 0.09. Volume for volume, however, the heat capacity of the aluminium is less than that of these heavy metals.

The latent heat required to change pure aluminium from the solid to the liquid state without increase of temperature is about 92 cal/gm. This again is high on the basis of weight, and nearly as much heat is required to raise a pound of aluminium from room temperature to the liquid state at 658° C as to raise a pound of iron past its melting point of 1500° C.

Reflection & Emission

A bright aluminium surface reflects about 85% of the light, and about 90% of the heat radiation, that fall on it. Thus buildings and containers made of aluminium keep their contents cool in hot weather without the need of elaborate insulation. Although the surfaces are most efficient as reflectors in their original bright state, the degree of dulling that occurs with the passage of time is not, in normal conditions, sufficient to interfere seriously with the reflection of radiant heat, so this property of aluminium buildings is, in effect, permanent.

Aluminium is also employed purely as a reflective insulating medium in the form of foil, which, arranged to form dead air spaces, offers an extremely efficient thermal barrier of very low weight; this system is increasingly used in building and in heating and cold storage engineering, and has the additional advantage of forming an effective vapour barrier. Aluminium paint provides a radiation screen as well as weather protection, and is used, for example, on storage tanks.

For optical reflectors it is usual to preserve the lustre of the polished, high-purity metal with a special transparent anodic film.

Emissivity, the readiness with which a substance radiates its own thermal energy, is closely allied to reflectivity, the best reflecting surface being the poorest emitter, and conversely. Thus the emissivity of aluminium is low (about 10% of that of the theoretical black body), and this contributes to its insulating properties. An interesting change is produced by anodic treatment, which can raise the emissivity of the surfaces considerably; this process is of value in the construction of heat exchangers.

Temperature & Strength

In general, aluminium and its alloys suffer a loss of strength at temperatures much above 100° C; the highest operating temperature for any alloy is about 350° C, and this is only compatible with low stresses, as in pistons. The original strength is in many cases not fully restored on cooling, as the effects of work-hardening or heat treatment have been removed by heating, and the structure permanently changed.

Time also plays a part, and some alloys may be damaged by prolonged exposure to temperatures that, for short periods, have a negligible or even, by causing precipitation, a beneficial effect on their strength. Another effect of subjection to prolonged elevated temperature when under stress is to encourage plastic flow, or creep, which was discussed in our sixth article.

A problem that is met with some structural metals, such as iron and steel, is embrittlement when subjected to low temperatures. The aluminium alloys, however, at the lowest temperatures that normally interest the engineer (those found at great heights and in polar regions) are slightly stronger and considerably more resistant to impact than in temperate conditions. This characteristic is valuable in aircraft engineering.

May we send you a copy of the Noral Data Sheet, giving physical and mechanical properties of our alloys? Please mention this journal when writing.

The next article is concerned with the electrical properties of aluminium.

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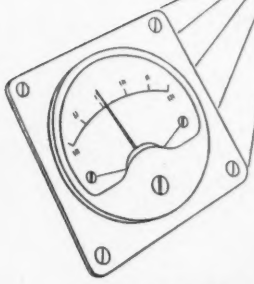
The problem of CABIN TEMPERATURES



With military aircraft now designed for operational altitudes from sea level to 50,000 feet at speeds exceeding 600 m.p.h., the stabilisation of cabin temperature and pressure becomes a vital factor. Apart from the necessity of removing heat from pressure-air fed to the cabin, there is the additional problem of increased cabin temperature due to friction of the boundary layer.

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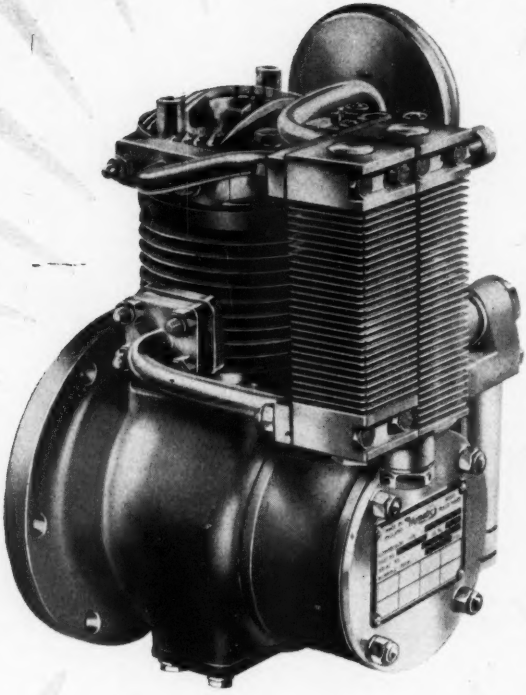

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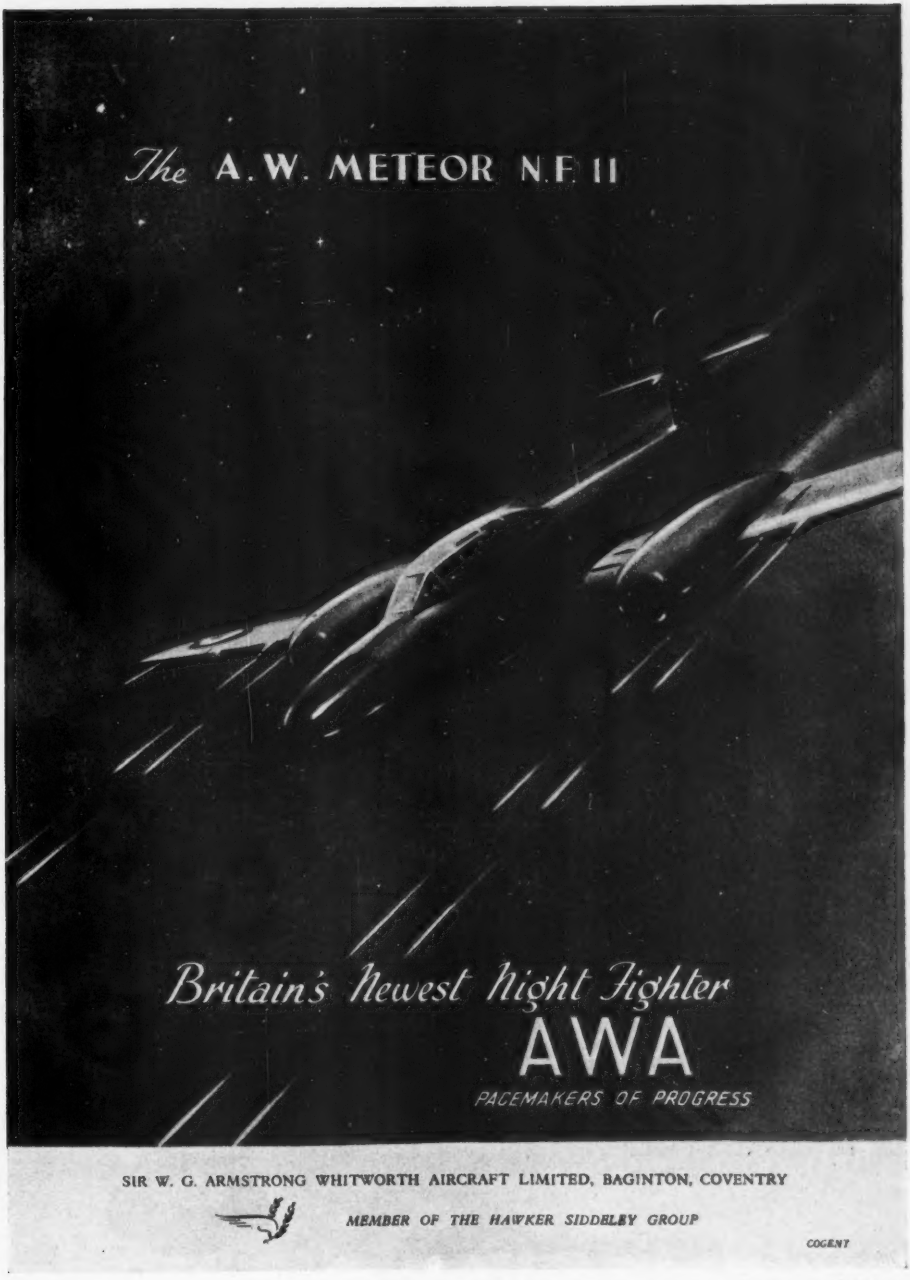

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That is how Mr. A. J. Lewis, chief pilot of the Indonesian division of the Christian and Missionary Alliance, sums up the Short Sealand Amphibian. His letter to Shorts is the story of a Sealand's triumph over flying conditions as bad as any in the world.

Before I left Indonesia on furlough, the Sealand had flown about 100 hours. In that time I have been able to evaluate it in conditions that would demand not only the Sealand's best, but results unobtainable by any other aircraft.

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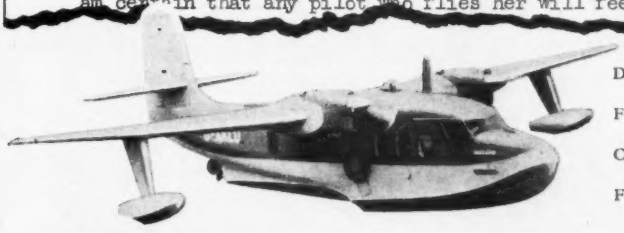
One of the sites in constant use is located in the very heart of Borneo some 200 air miles from the sea. The Kayan river here measures only 175 ft. at the narrow part of the take-off and landing runs. The river bends at least 30 degrees, first right and then left, and during the take-off a small rapid must be passed through. Once airborne the aircraft must turn through 100 degrees in order to follow the narrow valley between mountains which tower nine to ten thousand feet above the river. The river itself is 1726 feet above sea level.

It is not generally known that the Sealand is the only aircraft that has ever flown regularly in the interior of Borneo, and her ability to fly on one engine is most reassuring where landing sites are hundreds of miles apart. Long flights over the sea have also been undertaken and on a recent journey of 650 miles our fuel consumption was only 23 gallons per hour.

One of the outstanding features of the Sealand is the fully reversing and feathering airscrews. I have never handled a comparable plane on the water, where buoying and other details of handling are a real treat to undertake.

I personally recommend the Sealand on its flying ability and I am certain that any pilot who flies her will feel as I do.



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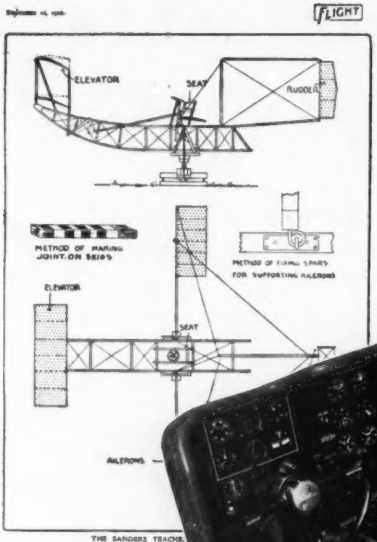

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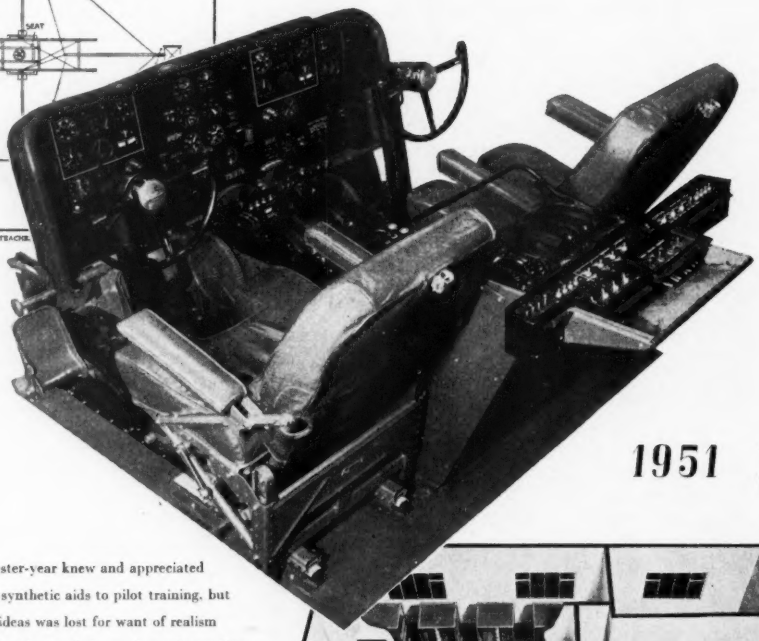
1910

Pioneers in Flight Simulation



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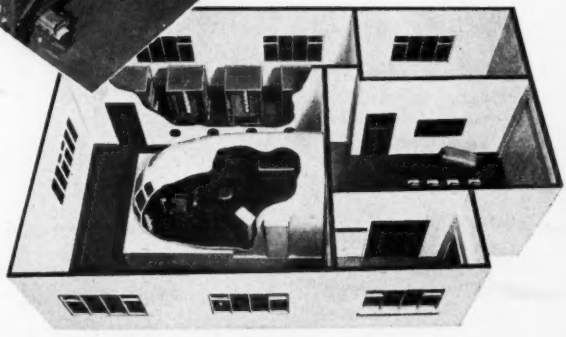

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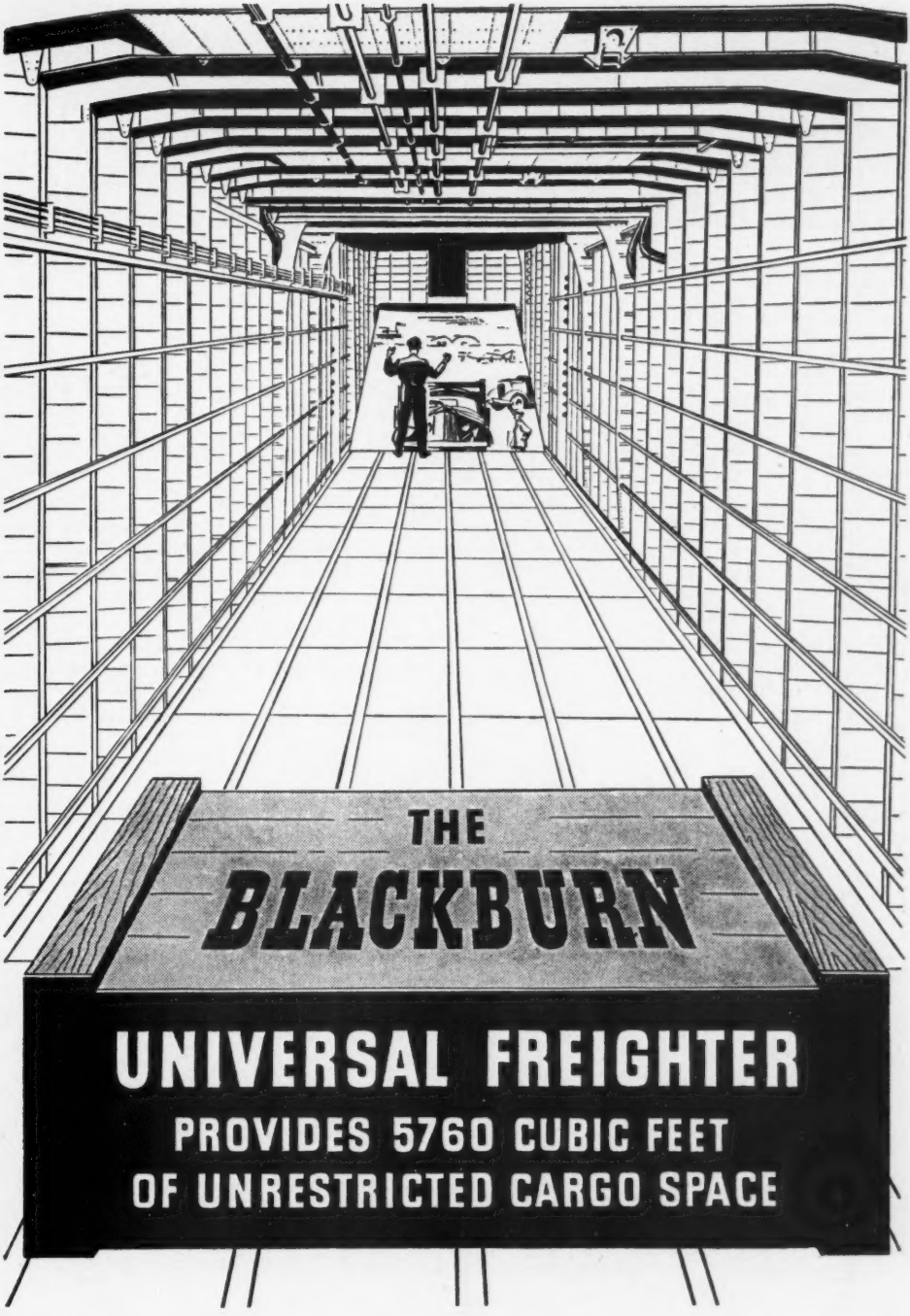
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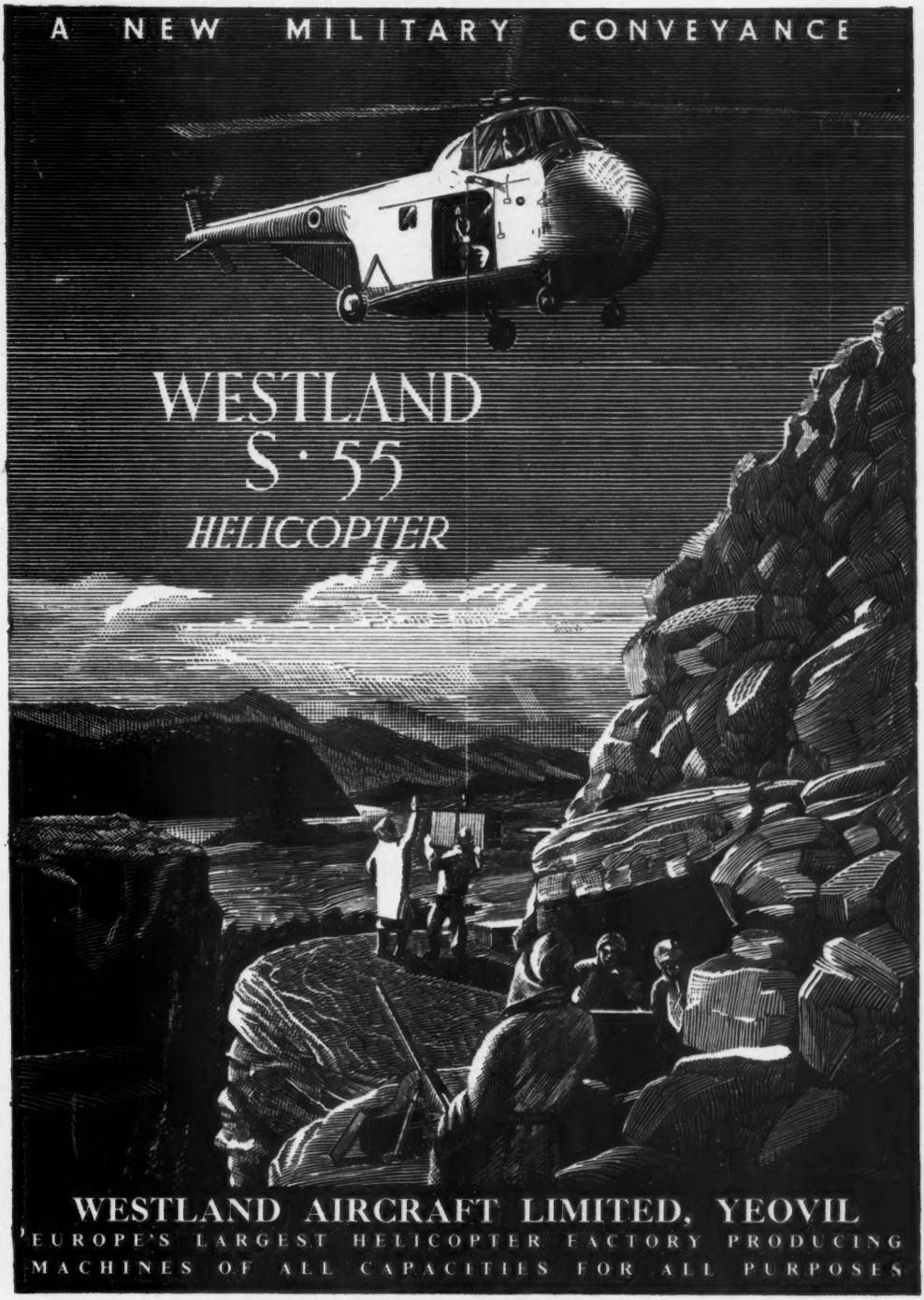
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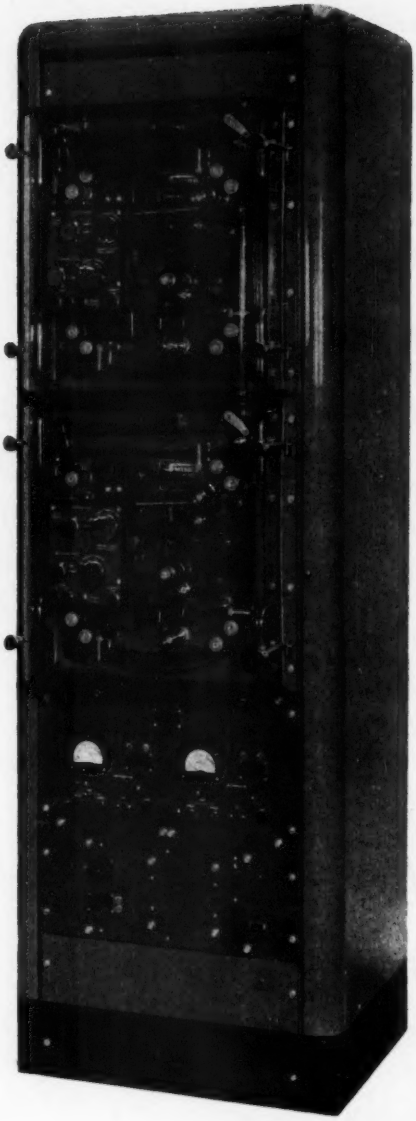

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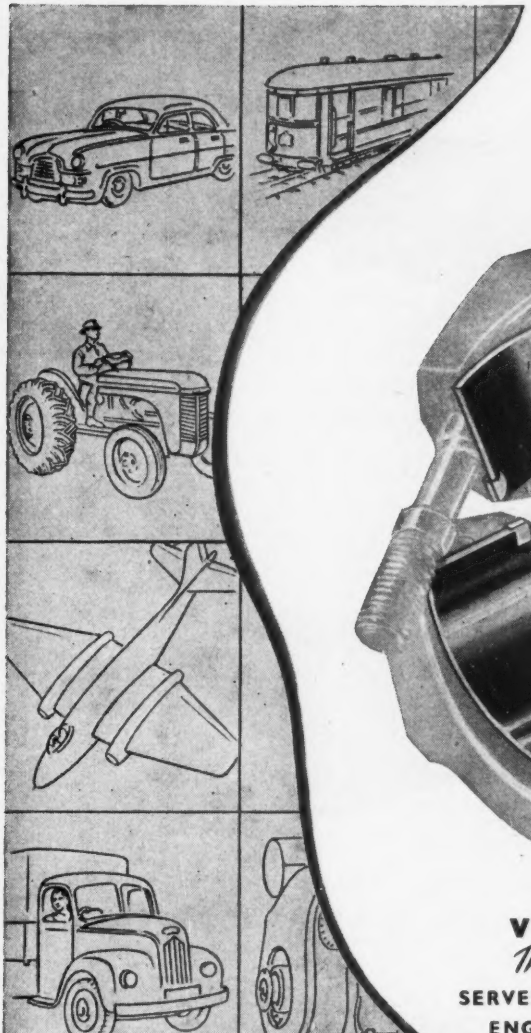

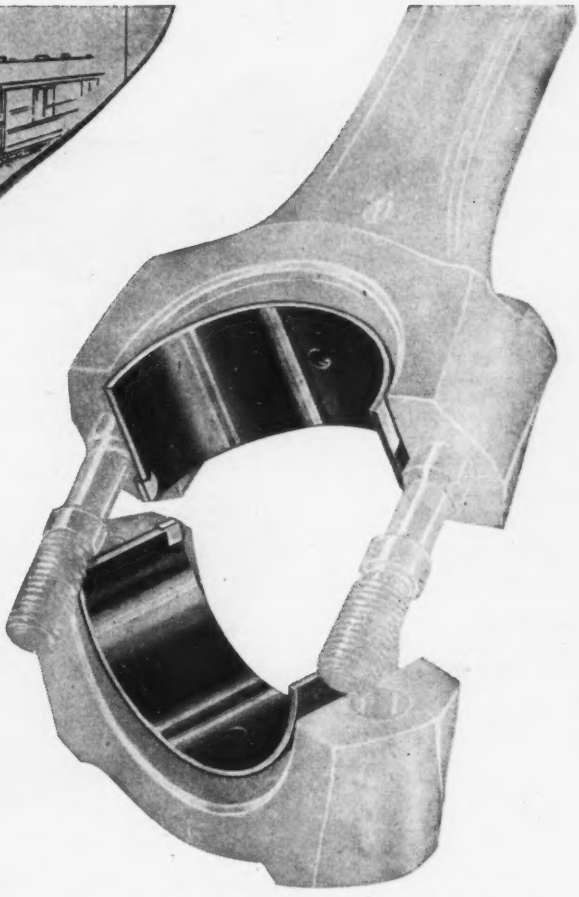

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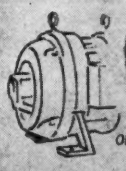

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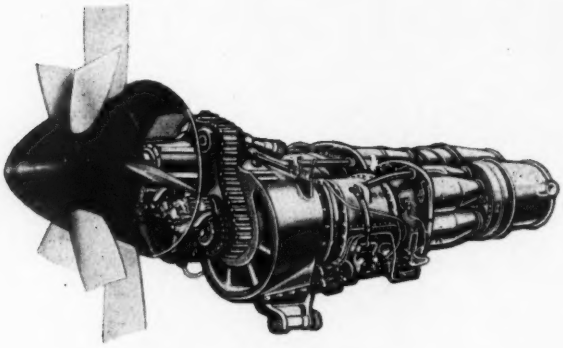

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C

Air Transport Opportunities

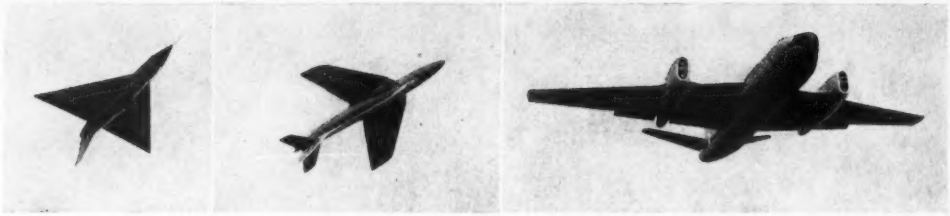
DURING recent weeks this country has been the centre of unprecedented aeronautical activity; almost every branch of aviation has received attention during the various conferences, exhibitions and displays. Not only those both from home and abroad who are directly conderned with aeronautical affairs, but also the British public, have taken an important part in many of the activities—meeting the Air Force "at home" at a large number of R.A.F. stations, sharing in commemorations of the Battle of Britain, casting an increasingly knowledgeable eye over the industry's latest achievements as demonstrated at Farnborough and—unconsciously though it may have been—exerting a tremendous influence upon the deliberations of I.A.T.A. delegates at their world conference in London.

Despite the predominantly military flavour of the S.B.A.C. Display and Exhibition, which has profoundly affected all our thoughts, there is little doubt that during this period air transport and transport aircraft have been very much in the mind of both the industry and the public. Some forty years ago Kipling said that "transportation is civilization." His words were quoted by the S.B.A.C. president at the Society's dinner, and it would almost seem as if the majority of people has only recently realized or rediscovered their implications. Lord Bruce stated his opinion that air transport was a vital part of our defence programme and will be to the R.A.F. as the merchant marine has been to the Royal Navy. At the I.A.T.A. conference, the president, Sir Miles Thomas, said that it was the social responsibility of the air-travel industry to make its services available to every citizen in the world.

We could offer other quotations that show the leaders of aviation to be convinced that the world is on the threshold of revolutionary developments in air transportation. Already spectacular progress during the past year has been reported by the world's airline operators. We hope and believe that Kipling was right, and that aviation will provide the form of transportation that succeeds in civilizing the world. In the meantime, we have no doubt that the British aircraft industry will be ready to place its support squarely behind all those who advocate greater attention to the requirements of civil aviation.

To do so does not mean that defence commitments need necessarily suffer as a result. The Government and the manufacturers will certainly have to give even greater attention to the degrees of priority and may have to modify their schemes for distribution of materials. The necessary incentives will also have to be found to attract new manpower to the aircraft industry, which is still operating at less than one-tenth of its war-time peak. Exact figures, dull to quote, can be obtained from the Ministry of Labour, but as an indication of the manpower position we may mention that in 1939, when the shadow-factory scheme was beginning to show remarkable results, more than twice the present number was employed on the production of aircraft. More significant, perhaps, is the fact that, even though a great defence drive has been launched, the present rate of increase in the numbers employed in the aircraft industry is still only 10,000 per annum. But these measures, and others too, will be necessary in any case if the scale of defence production now planned is to be realized within a reasonable time. Existing production of new civil transports needs to be accelerated in the meantime.

Opportunities for the sale abroad—including America—of several types of British civil aircraft have never been brighter, and it would be disastrous if they were to be missed. Apart from the urgent need to expand still more the country's exports (dollar-earning being the foremost consideration), the adoption of a new civil aircraft type often leads to allegiance to a particular make for years to come—as British aircraft salesmen know only too well. This is, of course, the result of spares provisioning, familiarity with manufacturing and servicing methods and equipment, the formation of personal and business associations, and the comparatively long life of a given design with its developments. Thus, potential orders which are not secured at this vital juncture, when first-class new British turbine transports are ready to take over from and replace earlier piston-engined machines, may mean a closed market for many years. This is a danger which must be avoided at all costs.



FARNBOROUGH, 1951

An Appraisal of Aircraft and Power Plants

ILLUSTRATED WITH "FLIGHT" PHOTOGRAPHS

OUR preliminary survey of the 12th S.B.A.C. Flying Display and Exhibition at Farnborough, published last week, carried the story to the evening of technicians' day (September 11th). On that occasion a few aircraft failed, for one reason or another, to take their place in the flying programme, but, except for the Vickers-Supermarine Swift, which had belly-landed near Chilbolton, all those scheduled to perform were seen in the air on subsequent days.

In the present account selected aircraft and power plants receive individual attention, and some notes are added on certain flying performances. Accessories and ancillary equipment will be dealt with in the following issue.

Military and Research Aircraft

Armstrong Whitworth (Gloster) Meteor N.F.11. The specimen shown represented the latest development of this tandem-seat, radar-equipped night fighter, having wing-tip auxiliary tanks instead of those formerly attached beneath the wings. These 100-gall tanks are of light alloy and have lozenge-shaped fins on their forward ends to deflect them upwards and outwards on release. The wing-tips themselves have been re-designed and are now square-cut, like the tailplane. Flash eliminators are fitted to the projecting muzzles of the four wing-mounted, electrically fired, British-Hispano guns.

Auster Model S. A useful amount of information concerning this new air observation post/liaison aircraft was released for the first time. The observer's seat can face sideways or rearwards and alongside the pilot (who has a back-type parachute) is provision for an Army 62 or later-type radio. The radio and its mounting can be removed in a few seconds. For maximum thrust and efficiency throughout the speed range a Hordern-Richmond (Aeromatic) variable-pitch airscrew is fitted. The direct-injection Cirrus Bombardier is said to respond instantly to rapid throttle movements, and this would promote confidence in a pilot when operating from small fields. A Coffman cartridge starter is a standard fitment. Performance and other data are: all-up weight, 2,025 lb; take-off run (still air), 115 yd; take-off run to 50ft, 240 yd; landing run from 50ft, 250 yd; max. rate of climb, 1,200ft/min; cruising speed, 117 m.p.h.; still-air range, 230 miles.

Avro 707A. Of orange hue and unmistakable form, this delta-wing research aircraft made a striking spectacle in the aircraft park, where it was incarcerated while the 707B astonished all beholders in the air. Differences from the "A" in wing, intake and control design have already been remarked upon in *Flight* of August 10th. Both variants have an 8ft tail parachute.

Avro 707B. One of the most vivid memories of this year's display must surely be that of the Cellon-blue 707B passing by under perfect control, looking like some exotic moth with folded wings and, we suspect, with the clock reading little more than 95 knots. In every respect "Roly" Falk's demonstration was masterly: he told his audience more about his mount in three minutes than the present writer would care to essay in as many hours. It is no longer a secret that the handling qualities and performance of the 707 have surpassed the makers' most sanguine expectations, and it is our own belief that the 707 will command a place alongside the Gloster-Whittle E.28/39 as an aircraft of truly historic importance. Whereas the 707A has flown for relatively few hours, the "B" has already completed much of its testing programme, and bomber chiefs and airline executives alike are impatient for the splendid long-range, high-altitude aircraft it portends.

Avro Ashton Mk 2. Superficially similar to the first (Mk 1) Ashton introduced at Farnborough last year, this new version is fully equipped and furnished for the investigation of cabin-conditioning problems at levels around 40,000ft. Thirty-two ex-B.O.A.C. double-chairs and two toilet rooms are installed. Six Ashtons have been ordered by the Ministry of Supply; the third has already flown and the fourth is well advanced. The Ashton's gross weight is 82,000 lb, which gives a wing loading of 57.6 lb/sq ft. A considerable amount of flying at 40,000ft has already been completed.

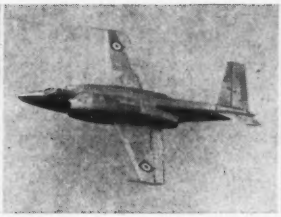
Avro Shackleton. Distantly glimpsed, in its Coastal Command colours, this long-range sub-hunter resembles the white cliffs of Dover themselves, which is right and fitting. It is already giving excellent service and new marks may be expected. "Johnny" Baker showed how speedily, with the aid of four Griffons and a modicum of momentum, the Shackleton can absent itself from an unhealthy target area.

Blackburn and General Aircraft G.A.L.60. A complete lower-fuselage section of this freighter was displayed in addition to the actual aircraft in the flying programme. In his demonstration on Wednesday "Tim" Wood appeared to stop this towering, bogie-hung monster in under 200 yd from touch-down, using reverse-pitch (from the instant the wheels touched) and multiple-wheel braking. This most impressive performance is of particular significance in view of our very serious lack of military freighters capable of operating from confined spaces.

Boulton Paul P.111. Lt. J. Elliot, of the Aerodynamics Flight, R.A.E., was in charge of this advanced delta-wing, high-speed research aircraft, and very remarkable was his exposition of its qualities. Due in part to its comparative silence, the fast, low runs seemed appreciably slower than those of the newest fighters, but some of Elliot's zoom-climbs were of astonishing steepness and duration. Most impressive were his rapid rolls.

Bristol Proteus-Lincoln. Since its first appearance last year this test-bed has been amassing hours with two 3,500 e.s.h.p. Proteus turboprops, destined for the Brabazon II, Britannia (Type 175) and Princess. The Brabazon I having been thrown open to public inspection out on the airfield, the Proteus-Lincoln was flown by "Bill" Pegg.

De Havilland Vampire Trainer. The value of this side-by-side Airspeed conversion in the purely training field is already well appreciated, though none of the type is yet in service. What is, perhaps, not generally realized is that the trainer can be used in a fully operational role, having full armament and a performance comparable with the Vampire 5 fighter/bomber. At 20,000ft the maximum speed is 549 m.p.h.



De Havilland Reheat Venom. This is a Mk 1 Venom fighter/bomber with an afterburner (reheat) applied to the de Havilland Ghost turbojet. When requiring thrust augmentation from this quite unobtrusively installed fitment, the pilot presses a button which operates the high-pressure fuel cock, and pushes a lever to ignite the extra fuel. The resulting noise is that of a gargantuan blowlamp, but the flame is less apparent than in earlier experimental installations. The Venom's climb, demonstrated by C. D. Beaumont, is of the Waygood-Otis order.

De Havilland Sea Venom N.F.20. The makers unequivocally claim for this side-by-side, carrier-borne, two-seater, so dashingly demonstrated by John Derry, that its radar and navigational aids permit, for the first time in such a machine, real "all-weather" operations. Not only is it to be standardized by Britain and France, but by Australia also.

English Electric Canberra P.R.3. A cursory examination suggested that this photographic reconnaissance variant of the Canberra carries seven cameras in all—four obliques forward, one oblique aft, split verticals aft. Fuselage length is 66ft 8in.

English Electric Canberra B.5. Though not announced on the programme, a Canberra of this mark appeared last Thursday in place of the P.R.3. The B.5 is a target-indicating variant and is distinguished from the B.2 by its larger bomb-aimer's panel, with a circular sighting window at its forward end. On Friday, T. O. B. Evans coped very expertly indeed with a tyre-burst which followed a brake-seizure after touch-down.

Fairey Firefly A.S.7. The large containers slung beneath the wings of this new Firefly three-seater anti-submarine development (inboard of the radar housing and auxiliary tank respectively) house sonobuoys, which sensitive little transmitters demand warmth. No guns are fitted, but eight R.P.s were carried inboard of the sonobuoy containers during Mr. Matthews' flying displays.

Fairey Gannet. The Gannet prototype displayed had two cockpits forward and a third (two-seater) positioned aft. On production aircraft the aft enclosure will house one operator only and will be correspondingly smaller. The wing "fences," fitted for some time past, have now been removed. Performance, as demonstrated by Messrs. Slade and Twiss, seemed remarkably good, having regard to the bulk of the aircraft, and loops, rolls and aileron turns were taken in its stride.

Gloster P.V. Meteor. S/L. Jan Zurakowski, who was responsible for all development and experimental flying on the type, surpassed himself on this private-venture ground-attack fighter. For all its demonstrations it carried 24 rockets (beneath the wings and fuselage) and fuel tanks at the wing tips. There was great argument concerning the nature of the astounding manœuvre which preceded the spins, executed so unconcernedly by "Zura," the master-craftsman. Some inside information on this so-called "cartwheel" appears on page 383.

Handley Page (Reading) Mamba-Marathon. F/L. de Villiers, chief test pilot of de Havilland Propellers, Ltd., left no doubt as to the efficacy of the D.H. reversible-pitch airscrews driven by the A.S. Mamba turboprops. The ground run is halved by the action of these airscrews, and it is claimed that the operation into, and out of, negative pitch is much more rapid and smooth than with any reciprocating engine.

Hawker P.1052 (Naval). The "navalized," swept-wing P.1052 came as something of a surprise, though such a development of the basic Sea Hawk design is a very logical one. In this connection it may be remarked that the U.S. Navy has adopted a deck-landing version of the Sabre.

Hawker P.1067. The speed of Neville Duke's low runs in this Avon-powered transonic intercepter astonished even Americans who saw the Sabre establishing its world record of 670.981 m.p.h. three years ago. British fighter pilots remarked also on the very high rate of roll and the wide-track undercarriage, and everyone was captivated by the unsurpassed beauty of line. The nosewheel retracts forwards and tailplane incidence is variable. There is no sign of armament on the present prototype and there was some criticism that the hood does not afford rear vision.

Hawker P.1072. To everyone's regret, this P.1040 development, adapted for development-flying with the Armstrong Siddeley Snarler liquid-rocket motor, remained silent and static.

Napier Nomad-Lincoln. This particular Nomad installation bears little relationship to any at present foreseen. One obvious

Below, Vice-Admiral Sir George E. Creasey, K.C.B., C.B.E., D.S.O., M.V.O., Vice-Chief of Naval Staff, congratulates E. C. Bowyer, Director of the S.B.A.C. Right, reading l. to r., A.Cdre. G. Silyn Roberts, C.B.E., A.F.C., Deputy Chief of Military Aircraft Research and Development, J. Summers (Vickers-Armstrongs), Maj. Gen. F. R. Dent, Jr., U.S.A.F., Commanding General, Wright Air Development Force, and Maj. Gen. Leon. W. Johnson, Commanding General, 3rd Air Force, U.S.A.F.

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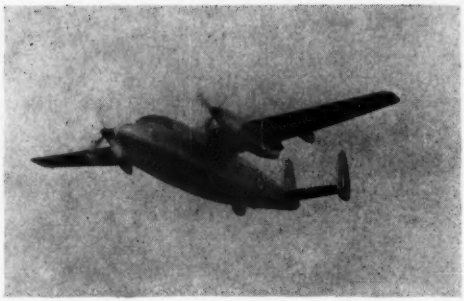
Nomad application would be aircraft of the Shackleton class. The Nomad-Lincoln's fuselage, incidentally, has been reinforced by six substantial fore-and-aft stiffeners, externally applied.

Percival Provost. In the hands of R. G. Wheldon, this Leonides-powered prototype of the R.A.F.'s production-type trainer gave one of the most exhilarating displays of all. After a ten-turn spin it went romping around the airfield and sky apparently with abandon, but, in point of fact, with premeditated intent, for it was Mr. Wheldon's purpose to show just how manœuvrable is the Provost. That he succeeded is a tribute both to his skill and to the qualities of the aircraft.

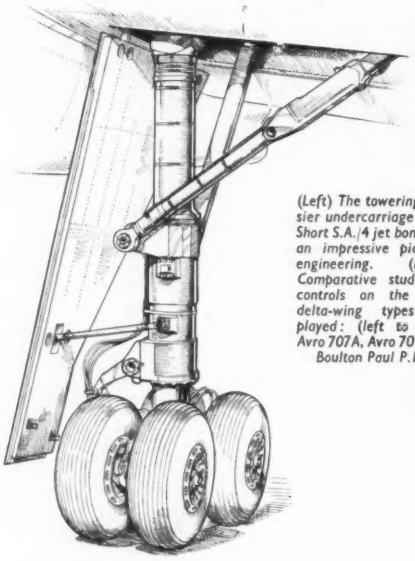
Percival Sea Prince. Though the training and communications duties foreseen for this near-relation of the R.A.F. Pembroke do not demand Provost-like manœuvrability, the Sea Prince (with its new twin-wheel main undercarriage) was shown to be uncommonly agile. One of these capacious machines, incidentally, was recently delivered to the Naval Staff of the Joint Services Mission in Washington, and in America, we believe, its qualities will be equally appreciated.

Short S.A./1. Pendin gcompletion of resonance tests, a speed limitation is imposed on Mr. Brooke-Smith in his demonstrations of this four-Avon long-range bomber; but he amply made up the temporary deficiency in knots with his very low, slow fly-pasts along, and occasionally above, the enclosures. Almost without exception, Short-built aircraft have been noted for their low-speed qualities, and this massive newcomer is evidently no exception. Whatever its future, it is a most welcome addition to the ranks of British military aircraft.

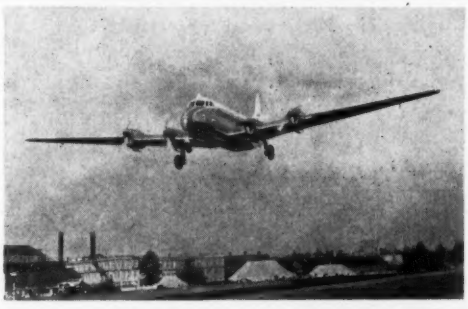


Handley Page (Reading) Marathon, powered with two Armstrong Siddeley Mambas driving de Havilland reversible-pitch airscrews. This is the world's first turboprop aircraft to have airscrew braking.

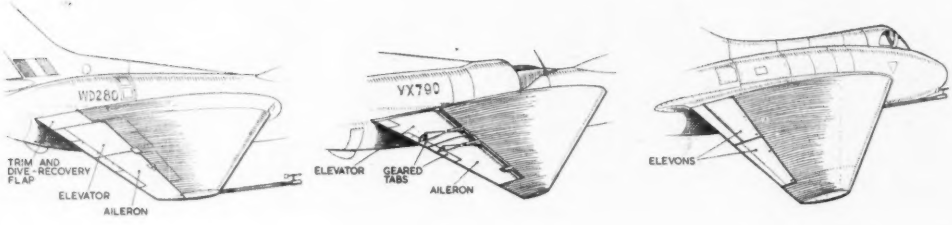
Take-off study of the Hawker P.1067 intercepter (Rolls-Royce Avon), showing how the main wheels retract into the fuselage and the nosewheel strut folds forward.



(Left) The towering Messier undercarriage of the Short S.A./4 jet bomber—an impressive piece of engineering. (Below) Comparative studies of controls on the three delta-wing types displayed: (left to right) Avro 707A, Avro 707B and Boulton Paul P.111.



The de Havilland Heron (four ungeared, unsupercharged D.H. Gipsy Queens) looks strikingly handsome in its B.E.A. livery, its fixed undercarriage notwithstanding. The take-off was remarkably short.



*Vickers-Armstrongs Valiant B.*1. There is little to add to our previous observations on this splendid four-Avon bomber, so stylishly demonstrated by Mr. G. R. Bryce, except to draw attention to the large, double-slotted flaps. It is doubtful whether the machine is stressed for violent low-level manœuvres at high speeds, as is the Canberra, so its performance could only be truly appreciated at the upper levels. Perhaps in years to come guests will be taken aloft in an aerial grandstand (Brabazon II?) to study the behaviour of such machines to better advantage.

Vickers-Armstrongs Varsity. A standard specimen of this twin-Hercules crew-trainer and multi-purpose aircraft was statically shown.

Vickers-Supermarine Attacker. As previously noted, a land-based Attacker was exhibited with full armament and "slipper" tanks. With maximum fuel load the Attacker has an endurance of 3.86 hours and a 1,190-mile range.

Vickers-Supermarine 535. Though lower powered than its successor, the Swift, the 535 remains a very fast aircraft indeed; of this Mr. D. W. Morgan left no doubt. His use of partial flap in fast, tight turns was interesting. There was no evidence of reheat, though the fuselage is designed for such an installation.

Vickers-Supermarine 508. Points to note on this twin-Avon naval fighter, aside from the neat power-plant installation and unorthodox "butterfly" tail, are the "droop-snoot" leading edge (which, in conjunction with the large flaps, confers a moderate landing speed) and the four large gun ports beneath the Swift-like air intakes. The wing is remarkably thin and the wheels retract into the fuselage. Lt. Cdr. Lithgow showed that the 508 gets off quickly, climbs well and has a fast rate of roll. For the present, its speed is restricted to an unspecified figure, but the type is obviously very fast and should lend itself to the fitting of swept-back flying surfaces.

Westland Wyvern T.F.4. Mr. R. S. Bradley made a quick take-off in this Python-powered, production-type, strike fighter, though it was handicapped by a torpedo and drop tanks. His runs-past were impressively fast and, external stores notwithstanding, a fine rate of climb was evident immediately after take-off.

Civil Types

OF all categories of aircraft shown at Farnborough that in which the fewest innovations were apparent was the civil group. This, of course, does not mean that pre-occupation with the development of military machines has retarded the progress of those designed for more peaceful duties. In point of fact, most of the promising British commercial prototypes which made their Farnborough *début* two years ago are now about to go into service on the world's air routes. For this reason, the Comet and Ambassador, for example, did not take part in the flying display, but remained in the static park so that visitors might inspect their handsomely appointed interiors. The only really new machines to appear this year were both from the Auster stable—the versatile little B.4 Ambulance/Freighter and the lively Aiglet Trainer, which was admirably demonstrated on Saturday by Ranald Porteous.

In all, nine civil types were given a turn in the air, the remainder being shown either in the static park or in model form.

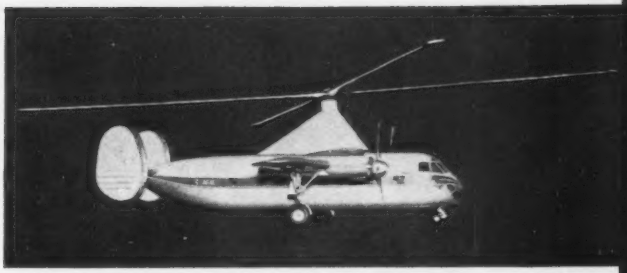
Airspeed Ambassador. An Elizabethan (B.E.A.'s class-name for the Ambassador) was shown in the static display, and a model of this 36/47-passenger twin-engined medium-range transport appeared on the de Havilland Airspeed Division's stand. The Ambassador is powered by two Centaurus 661s.

Armstrong Whitworth Apollo. A model of this Mamba-powered airliner was shown on the manufacturer's stand.

Auster Aiglet Trainer. A newcomer to Farnborough, this machine left an excellent impression of its manœuvrability and pleasant handling qualities. The power unit is a Gipsy Major I.

Auster B.4 Ambulance/Freighter. Also appearing for the first time, this single Cirrus-Bombardier-powered variant of the popular Auster series was seen to have a capacious rear-loading freight hold and an extra set of landing wheels at the rear of the cabin to take the place of the normal tail wheel. Its general configuration might be said to suggest a miniature G.A.L.60. It has a gross weight of 2,600 lb and a payload of 550 lb. The B.4's performance with the 180 h.p. Bombardier includes a 100 m.p.h.-plus cruising speed and a 200-yd take-off run. Even better performance is obtainable if the machine is fitted with a Continental E.190 engine.

Bristol Brabazon I. Being now partially furnished, the Brab was parked in the centre of the airfield so that visitors could inspect its interior. The machine did not take part in the flying demonstrations this year.



The model Fairey Rotodyne showed this projected design to be not only an eminently practical and attractive attempt at the "Green Line" coach of the air, but also capable of great development

Bristol Freighter 170. To demonstrate its high degree of utility the Freighter was shown in the static park with a dismantled Bristol 171 helicopter neatly stowed inside its spacious freighthold. A 171 helicopter was, in fact, recently flown out to Khartoum in this fashion.

Bristol Type 175. A model of this long- or medium-range Proteus-turboprop-powered transport, which is now being manufactured for B.O.A.C., appeared on the Bristol stand. A high power-loading and relatively low wing-loading will give the 175 particularly good take-off and landing characteristics. Its payload will be almost 25,000 lb for a still-air range of 4,000 miles.

De Havilland Chipmunk. A civil version of the Chipmunk was exhibited in the static park. Although primarily intended for military service, this Gipsy-Major-engined two-seat trainer is also widely used by flying clubs.

De Havilland Comet. Furnished in the style in which it will be delivered to B.O.A.C., a Comet—open for inspection by the public—proved outstandingly popular in the static display. A B.O.A.C. steward and stewardess conducted visitors through the attractive if conventional interior, in which examples of the Corporation's standard meals and drinks had been tastefully set out.

De Havilland Dove. The manufacturer's own demonstration machine, sporting the numerous national flags of the countries which it has visited, gave convincing evidence of its excellent climb characteristics. The engines are two Gipsy Queen 70s.

De Havilland Heron. Following closely on the heels of the Dove, from which it was, in fact, developed, the Heron took off to display its ability to operate from confined spaces. Remarkably short take-off and landing runs left little doubt of its aptitude in this connection. This machine was sporting B.E.A. colours as it has recently been used on experimental services to the Channel Islands. The Heron is powered by four Gipsy Queen 30s.

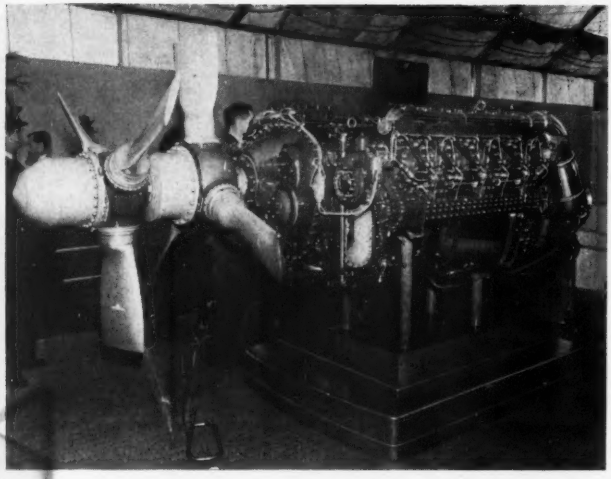
Handley Page Hermes V. Flown by S/L. H. G. Hazelden, this Theseus-powered version of the type now in service with B.O.A.C., gave a good account of its asymmetric-power capabilities. Using the Dunlop Maxaret anti-skid device, its landing run was also surprisingly short. Estimated performance figures for a projected Proteus version are 3,000 miles at 390 m.p.h. with 13,900 lb. payload.

Handley Page Marathon I. This useful four-engined feederliner has recently been examined by several operators from various parts of the world. One example was seen in the static park wearing the insignia and colour-scheme of the West African Airways Corporation, who are operating it experimentally. The power units are Gipsy Queen 70s.

Percival Prince. Although the Navy's Sea Prince was flown, exhibition of the standard Prince, was confined to the static display. On the Percival stand, also, there was a model of the Survey Prince, which, as its name implies, is specially adapted for photographic purposes.

Prestwick Pioneer Mk. 2. Being, in fact, flown by a helicopter pilot, this remarkable high-lift four-seater (one Alvis Leonides) showed itself to have take-off and landing capabilities almost rivalling those of rotary-wing machines.

Short Sealand. A smart white-painted Sealand amphibian (now seen to be without its experimental wing fences) made some excellent "one-fan" runs low down. Further evidence of its pleasant handling qualities was also seen in the graceful and precise fashion in which it touched down. The two power units are Gipsy Queen 70s; reversible-pitch airscrews are now fitted.



Given scale by the people near it, the Napier Nomad with its Rotol co-axial airscrews was certainly the largest, one of the latest, and specifically the most economical engine in the show.

Vickers Viscount 700. Brian Trubshaw's handling of the 700 showed to advantage its lively take-off. It was also seen to be highly manœuvrable with both port engines feathered. The Viscount has been ordered by B.E.A. and Air France. A model, in the latter airline's colours, appeared on the Vickers stand.

Saunders-Roe Duchess. A model of this medium-range Ghost-powered flying boat was shown on the manufacturer's stand.

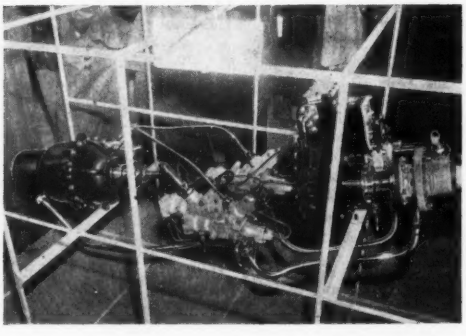
Helicopters

WHILST the Bristol 171 Sycamore traced invisible arabesques, and the Westland S-51 demonstrated the latest rescue technique to spectators out on the airfield, inside the exhibition tent rotary-wing aircraft developments were illustrated by models on the Bristol, Fairey and Westland stands.

Bristol contented themselves with a large and elegantly finished model of the new twin-engined twin-rotor Type 173; a detailed description of this fine machine appeared in the March 16th issue of *Flight*.

Fairey also confined themselves to showing one model of a rotary-wing type—the new Rotodyne. This aircraft, an artist's impression of which appeared in our September 7th special issue,

Mounted in a skeletal box, the Armstrong Siddeley Snarler rocket motor constantly received a great deal of attention. Water/methanol and liquid oxygen are fed by the fuel pumps (right) through the valve assemblies (centre) to the combustion chamber (left).



bids fair to become a great success if design logic is a criterion. By scale effect, we judge that the model shown represented a 24-seater and, from the intake grille at the base of the rotor pylon, it can be inferred that a third (buried) engine will be used to supplement the outboard units—which will almost certainly be Mambas or Darts. The essence of the design philosophy is that, for take-off and climb, the Rotodyne will function as a true helicopter, but for normal flight and landing, the aircraft will fly as a fixed-wing machine with the addition of an autorotating rotor. At the tip of each of the four rotor blades, incidentally, are small jet ducts; presumably air supplied by the compressors of the turboprop units is fed to these tip ducts, together with fuel, and the mixture there burned to drive the blades by jet thrust.

Westland had no fewer than five helicopter models on their stand. The S-51 and S-55 are, of course, familiar to readers, and brief mention has also been made of the future projects W-80, W-81, and W-85 (*Flight*, June 29th). The first of these is a twin-Leonides-engined single-rotor 20-seater, which, however, is likely to serve merely as a stepping-stone to the W-81, a larger (30-seat) aircraft which will employ an internally housed power installation quoted as being "of the Twin-Mamba type driving the four-blade rotor through a right-angle gearbox." Considerably the largest of the three projects, the W-85 is designed to carry 100 fully equipped troops or equivalent military load. Its "box-car" fuselage is surmounted by a pylon carrying an immense three-blade rotor driven by tip units of "Twin-Adder type or their equivalent in development."

New Engines

ALTHOUGH in terms of pure spectacle—"glamour appeal" if you like—other power units such as the exquisitely sectioned Perspex-cowled Proteus took pride of place, by the more mundane yardstick of technological novelty the stars among the cast of engines in the static exhibition were, without doubt, the Napier Nomad composite engine and the Armstrong Siddeley Snarler rocket motor. These two units, as opposed in concept, designed duty and appearance as could well be imagined, were constantly surrounded by interested viewers : what is more, this applied not only on Tuesday, the day set aside for technicians, but on the following days as well.

Before dealing with these units, however, mention must be made of the exhibit by Alvis of the Leonides 550 b.h.p. nine-cylinder radial. The most completely sectioned engine we have ever seen, it was fully cut-away through the vertical plane of the crankshaft and was, in addition, admirably "show-finished."

A high order of glossy enamel and bright-polished metal made the Nomad glisten and sparkle, too. But one was far more interested in finding which bit lead where and what such and such did and how that must do something else; an intriguing exercise. Differing in detail from the photographs of the unit published in our September 7th issue, the actual Nomad on the Napier stand at Farnborough was also equipped with co-axial Rotol airscrews; although the three blades of each of these were close-cropped, the hubs looked as if they might well suit the Saro Princess—as, indeed, might the Nomad itself, and to some effective purpose.

The power unit comprises a horizontally opposed 12-cylinder diesel engine which, however, would have given Rudolf Diesel considerably to think for not only is it highly supercharged, it is also a two-stroke and, what is more, it runs on paraffin. Crankshaft torque is given through a reduction gear to the rear airscrew. Exhaust gases are ducted from the 12 cylinders to one of a pair of turbines which, from the appearance of the shrouding, look to be two- and three-stage components. A pair of auxiliary combustion chambers serve to burn additional fuel to amplify maximum thrust for take-off and, to this end, feed the other turbine. The front airscrew derives its torque from the turbine shaft, albeit through a reduction gear.

Supercharging of the engine—or, at least, the gas-generating piston-unit part of it—is achieved through the medium of two entirely separate and quite different types of compressor. First there is an axial-flow component which we believe to be a development of that used on the Naiad, but which now operates at an unusually high compression ratio. This unit is driven by one of the turbines and delivers, without the interposition of an intercooler, into the eye of a centrifugal (second-stage) compressor, which is driven by the diesel half of the engine, and which delivers to the induction tract serving the cylinders.

Thus, to sum up, the Nomad is a twin-supercharged diesel two-stroke which drives one airscrew, and has its exhaust gases delivered to a turbine for driving another airscrew, the airscrews being co-axially mounted. Vital statistics so far publishable are that the Nomad produces 3,000 e.s.h.p. plus 320 lb residual thrust; weighs 4,200 lb dry; has a fuel consumption at maximum continuous power (s.l. static) of 0.36 lb/e.s.h.p./hr; is 10ft 6½in long, 4ft 10½in wide and 4ft 1½in deep.

As observed in the opening paragraph, the difference between the Nomad and the Snarler rocket could scarcely be more marked :

GLOSTER METEOR P.V.

GLOSTER AIRCRAFT COMPANY LIMITED · *Member of the Hawker Siddeley Group*

Do you know your airfields?

14

Recognise this airfield? It's No. 14 in this series of puzzle photographs. You'll find the answer below on the right. ★

It's no coincidence that almost all the British charter companies place implicit trust in the efficiency of the Shell and BP Aviation Service. For they know—as do many international airlines and private owners—that the familiar Shell and BP Aircraft Servicing Vehicles can always be relied upon for swift, friendly attention to their needs.

Shell and BP Aviation Service

Shell-Mex and B.P. Ltd., Shell-Mex House, Strand, London, W.C.2. Distributors in the U.K. for the Shell and Anglo-Iranian Oil Groups.

Weybridge ★

FARNBOROUGH 1951 . . .

the Nomad is large, is designed for extremely long-range operation, and is abstemious in its consumption of fuel, the Snarler is small, is designed for short-term operation, and its consumption of fuel is enormous. The Snarler actually shown on the Armstrong Siddeley section of the Hawker Siddeley Group stand was accompanied by an animated diagram illustrating the operation of the motor. The diagram was, however, schematic and beyond indicating that the fuel and oxidant pumps were of centrifugal type, gave no hint as to the intrinsic design of the other components.

From examination of the unit itself—resplendent in its black and cream paint and glittering with chromium plate—it could be seen that the Snarler comprises three main elements : the wheelcase and fuel pumps, the valve gear, and the combustion chamber. On the front of the wheelcase is the drive-face for an input-shaft, and the two fuel pumps (which as already stated are of centrifugal type) are mounted below this, and also on the front face of the casing. Delivery pipes from the fuel pumps are approximately 1in o.d. and feed into the battery of igniter and throttle valves which comprise the central section of the unit. From here, the fuels—water/methanol and liquid oxygen—are fed to the combustion chamber (again through 1in o.d. pipes) and the water/methanol is circulated in a cooling jacket around the combusion chamber prior to injection.

The designed endurance of the Snarler is three minutes at full thrust, but this figure is virtually a direct function of fuel tankage. The specific impulse of the unit is not available for publication, but the fuel volume emptied in even so short a time (relatively) as three minutes is likely to be considerable. Again, this is directly affected by the fuel used, and in this connection, the Snarler offers a break-away from accepted rocket practice in that it is designed to use readily available fuels; it is, in fact, hoped that petrol or standard aviation turbine fuel might eventually be used in place of the present water/methanol. Liquid oxygen—a non-toxic, non-explosive and non-corrosive fluid—will almost certainly continue to be used as the oxidant.

Sunday's Record Crowd

NOTHING could have been more encouraging to the organizers and exhibitors than the vast crowds which thronged the airfield, not to mention the surrounding countryside, on Sunday, the final public day. Some 140,000 were admitted, and many thousands more were to be seen in the roads and fields round about. No doubt many who had expected a "wash-out" on the previous day (though actually almost the whole programme had been carried through in appalling conditions) helped to swell the crowd.

The weather was only mediocre after a bright morning, but no one seemed to be discouraged and the pilots put on one of the best displays of the week—every manœuvre was well practised and the stagecraft had become almost perfect. It is practically impossible to single out individuals for special mention, but the crowd made it clear that they particularly enjoyed the large-aircraft circus, the many-turn spin of the Provost, and the close-up aerobatics of the Aiglet. The Pioneer's emulation of helicopter antics did not go unappreciated, and the droning Wyvern's fast fly-past and prolonged climb evoked an admiring "ooh!"

Among the individual efforts "Zura's" determination to find sufficient ceiling for his cartwheel delighted everyone, and the vicious whip stalls of his R.P.-laden Meteor—made in each case from the cloud fringes—were in themselves most spectacular. We have it on the authority of S/L. Zurakowski himself that in a vertical full-power climb he loses speed to 60-70 kt I.A.S., shuts down one Derwent and cartwheels under asymmetric power. After three-quarters of a turn he shuts down the second Derwent, and the Meteor, having unusually high inertia due to the rockets on its wings, carries on to complete one and a half cartwheels, finishing nose-down. Thereupon it starts a spin, but after a quarter to half a turn, at 90-100 kt, control begins to be restored. "Zura" emphasizes that one engine is *not* opened up, for whereas thrust can be lost, by throttling, in 1½ to 2 sec, full power is not forthcoming from a turbojet in under about 6 sec. For such a manœuvre it is necessary to have two power units fairly widely spaced. "Zura" considers a cartwheel to be possible on a Hornet, though he has never tried it.

The reheat-Venom lighting up with a bang like a gas oven, and then turning its twinkling purple-gold jet to the crowd as it roared heavenwards, warmed the hearts of every enthusiast. Neville Duke's transonic water-chute impression was once again breathtaking, and in spite of the increasingly fancy performance of the new 508 and the lively displays of the deltas, it remained the main subject for discussion several hours later as the traffic jams slowly unravelled themselves.

PARTICIPATING AIRCRAFT

Airspeed Ambassador	G-ALZP	2nd Production
Armstrong Whitworth (Gloster) Meteor N.F.11	WD604	Production
Armstrong Siddeley Sapphire-Meteor	WA820	Production Mk 8 airframe
Auster Aiglet	G-AMKF	Production
Auster Model S	WJ316	1st Prototype
Auster Model B.4	G-AMKL	1st Prototype
Avro Shackleton M.R.1	WB822	Production
Avro Ashton 2	WB491	2nd Ashton prototype
Avro 707A	WD280	3rd Prototype 707
Avro 707B	VX790	2nd Prototype 707
Blackburn and General Aircraft G.A.L.60	WF320	1st Prototype
Boulton Paul P.111	VT935	Prototype
Bristol Brabazon I	G-AGPW	Prototype
Bristol 170 Mk 31	G-AINO	Production
Bristol 171 Mk 3	G-ALTC	Production (in Bristol 170)
Bristol 171 Mk 3	G-ALSX	Production
Bristol Proteus-Lincoln	SX972	Proteus test-bed
de Havilland Dove 2	G-ALBM	Production
de Havilland Comet Series 1	G-ALYS	2nd Production (5th airframe)
de Havilland Venom F.B.1 (Reheat)	VV612	1st Prototype airframe
de Havilland Sea Venom N.F.20	WK376	1st Production
de Havilland Heron	G-ALZL	1st Prototype
de Havilland Vampire Trainer	G-5-7	1st Prototype
de Havilland Chipmunk	G-ALWB	Production
English Electric Sapphire-Canberra	WD933	5th Production airframe
English Electric Canberra P.R.3	VX181	1st Prototype
English Electric Canberra B.5	VX185	1st Prototype
Fairey Firefly A.S.7	WJ216	1st Production
Fairey Gannet	WE488	3rd Prototype
Gloster P.V. Meteor	G-7-1	1st Prototype (formerly G-AMCJ)
Handley Page Hermes V	G-ALEV	2nd Prototype
Handley Page (Reading) Marathon I	G-AMEO	Production
Handley Page (Reading) Marathon II	VX231	1st Prototype (formerly G-AHXU)
Hawker P.1052 (Naval)	VX272	1st Prototype airframe
Hawker P.1067	WB188	1st Prototype
Hawker P.1072	VP401	1st Prototype (formerly 1st prototype P.1040)
Napier Nomad-Lincoln	SX973	Nomad test-bed
Percival Provost	WG503	1st Leonides prototype (formerly G-23-1)
Percival Prince	G-AMMB	Production
Percival Sea Prince	WF920	1st Prototype
Scottish Aviation Pioneer 2	G-AKBF	Prototype
Short S.A./4	VX158	1st Prototype
Short Sealand	G-AKLV	Production
Vickers-Armstrongs Varsity T.1	WF330	Production
Vickers-Armstrongs Valiant	WB210	1st Prototype
Vickers-Armstrongs Viscount 700	G-AMAV	1st Prototype
Vickers-Supermarine Attacker	G-15-110	Prototype
Vickers-Supermarine Type 508	VX133	1st Prototype
Vickers-Supermarine Type 535	VV119	1st Prototype
Westland Wyvern T.F.4	VW870	Mk 2 modified to Mk 4
Westland-Sikorsky S-51	G-ALIK	Demonstration model

A Spotter's View

NEVER before have the machine parks displayed such a profusion of colour. The Avro 707A and B were finished in a salmon pink-cum-orange and bright blue respectively, while the P.1067 and P.1072 appeared in a delightful shade of pale green or "duck-egg blue." Shorts provided contrast on their S.A./4 with a battleship-grey top surface and black underside, broken by a maroon "cheat-line."

One or two changes were apparent in Service markings. The latest aircraft were without the yellow P in a circle which has hitherto branded a prototype and, in the case of the Vickers-Supermarine 508 and the Valiant, the narrow yellow circle round the circumference of the roundels recalled the Kaiser's war. Camouflage on the Meteor N.F.11 was a reminder that this useful form of decoration has not been forgotten; in fact, several different types now coming off the assembly lines are resplendent in green and grey camouflage. Two shades of green and the omission of a fin-flash has become standard Naval styling.

A few of the aircraft were reappearing either with new markings or with a different designation. For example, the private-venture Meteor made its début in the static park last year with the civil registration G-AMCJ, whereas this year it flew with G-7-1 standing out boldly on its silver finish. This registration has been allocated under the S.B.A.C. system, G-7 being the index number allotted to Glosters and the 1 signifying the first aircraft at present flying under this allocation. Should the P.V. Meteor be accepted for the R.A.F. it would be given a Service serial, and the number G-7-1 would become vacant for allotment to any later private venture. Thereby more than one aircraft can have the same registration—but obviously not at the same time. An example of this is provided by Percivals, who hold the symbol G-23 and, in the course of the last three or four years, have given the registration G-23-1 to a Prentice for the Argentinian Air Force, the first prototype Prince (later G-ALCM) and, more recently, the P.56 Provost (now WG503).

The first prototype Venom I (VV612) and the first prototype Hawker P.1052 (VX272) both appeared with modifications, while VP401, which was the original Hawker P.1040, was also in the picture as the P.1072. These facts show how firms are getting as much life as possible out of every available airframe—a practice initiated during the war and which has brought the term "flying test-bed" into the aeronautical dictionary.

B.I.A.T.A. MEETS LORD OGMORE

Three More Auxiliary Transport Squadrons to be Formed

LORD OGMORE, Minister of Civil Aviation (just returned from Africa) was guest of honour at the British Independent Air Transport Association's first annual dinner (held at Londonderry House last Friday) since it was reconstituted and renamed. Previously, of course, this organization was the British Air Charter Association and, incidentally, the name "British Air Services," the first proposal when a change of name was considered, was officially vetoed.

Mr. Eric Rylands, chairman, summarized for the benefit of the guests the Association's work, plans and aspirations. Among his audience were a number of leading figures in civil and Service aviation and in the political field, and he appealed to the Minister for his help in several matters.

B.I.A.T.A., said Mr. Rylands, was a smaller organization than last year but was a good deal stronger, and he was hopeful that one or two other companies outside the Association would join in the near future. He wished first to stress that members sought an opportunity to serve, and felt that they could do so with satisfaction; moreover, a variety of aircraft types, large and small, were available.

There had been no recognition so far of the proposal to form a merchant air service, but since the Berlin Air Lift individual tasks and contracts had been given. Mr. Rylands was glad to announce in this connection the formation of three new Auxiliary Transport Squadrons, the companies concerned all being members of the Association. They were Scottish Aviation, Ltd., Hunting Air Travel, Ltd., and the Lancashire Aircraft Corporation, Ltd. These three units would, of course, operate in addition to the one already formed by Airwork, Ltd. As well as providing a merchant air force, these companies would make an even greater contribution by training pilots up to a standard of readiness which, in emergency, would permit their immediate employment in Transport Command. Mr. Rylands said the Association was grateful to B.E.A. for demobilizing its charter section, and he hoped that the Minister would persuade B.O.A.C. to follow this lead. As taxpayers the Association regretted the losses on B.E.A.'s internal routes, and he suggested to Lord Ogmore that the independent operators could give further help in relieving the taxpayers of this burden.

Mr. Rylands then went on to speak of the tremendous capital outlay entailed in replacing an aircraft fleet today, saying that in some instances associate agreements for services would need to be signed for at least ten years to make replacements possible. He next paid a tribute to the good start and good work of the International Federation of Independent Air Transport Operators. So far this was dependent upon French and British energies. The co-operation between Air France and independent operators in that country was very good and worth examination by others.

Making his perennial reference to the petrol tax, Mr. Rylands pointed out that in effect the independent air operators were alone paying this duty, for manufacturers made allowance for it in their contract costs while the State airlines, because they did not meet their overheads, were in effect subsidized against it. Very properly, the flying clubs received a grant in this connection. Thus, the charter operators alone paid.

Replying, Lord Ogmore said that Government policy recognized the place of independent air operators and were seeking extra contracts for them, such as trooping. The Minister said that a reduction in the fringe of scheduled services was inevitable as the Corporations developed, but there were 45 associate services in operation, of which 20 were on five-year contracts. He had noted the suggestion that ten-year contracts would be necessary, and he recognized that the cost of aircraft replacement was extremely high. Small operators in Africa had tackled him on the same subject. Lord Ogmore criticized the state of affairs wherein 100 applications for associate agreements had been granted, but of these 57 had been withdrawn by the companies concerned, for reasons unknown to him. Apart from the unnecessary work entailed, this may have prevented other unsuccessful applicants from obtaining approval and operating the services. He realized that this year might have been a special case due to the shortage of aircraft and crews.

The Ministry could not agree to any introduction of long-term rigidity into the air services, and he could promise no protection for the "fixed-wing" operators when helicopters became available for city-to-city services. Lord Ogmore fully believed in helicopters and had advised local authorities to make provision for heliports in their town planning. Possible sites in London were now also being examined.

The Minister then went on to speak of civil flying careers. Plans were being tackled to enable the outflow of pilots from the R.A.F. to become available to the air operators. It was essential that the attractions of a career in civil aviation be made known to pilots before they even entered the R.A.F. and while still at school. In this way a continuous career in flying, and not just a period in the R.A.F., could be visualized.

Finally, Lord Ogmore spoke of the new terminal building for London Airport and of the Alcock and Brown memorial, an appeal for which is to be handled by the Royal Aero Club. There was a limit to the fee chargeable for landing, he added, but there is room for increased business concessions for shops, visitors, and even the 3,000 acres of grass at London Airport.

A. CDRE. MAYCOCK—AN APPRECIATION

A FORTNIGHT ago we recorded the death, in Stockholm on August 21st, of A. Cdre. R. B. Maycock, O.B.E. The funeral took place at the English Church in Stockholm on August 27th and was attended by, among others, General Bengt Nordenskiöld, Commander-in-Chief of the Royal Swedish Air Force, other senior officers of the Force, and directors of the Scandinavian Airlines System.

In sending us news of the funeral, Mr. A. W. Wicander, of Salén and Wickander AB, who was a colleague and close friend of A. Cdre. Maycock, adds the following notes and appreciation:—

"He became connected with the British Embassy as Air Attaché in September 1941. During the war he did great work for his country and also for Sweden. You will recollect that the first V.1s and V.2s landed in Swedish soil, and he arranged for them to be packed in crates and delivered to England, where they were afterwards reconstructed.

"When Salén and Wicander AB in Stockholm became agents for Rolls-Royce, Ltd., General Bengt Nordenskiöld suggested A. Cdre. Maycock's employment, and during his subsequent time with our firm he did a magnificent job in everything that concerned aviation. He also represented us in negotiations with British firms outside aviation.

"All his associates in Sweden would like his English friends to know that he leaves behind with us the memory of a great gentleman and a loyal friend."

FOR TECHNICAL ACHIEVEMENT

Seen here receiving their awards from the President of the Royal Aeronautical Society, Major Frank B. Halford, on the occasion of the presentation of the Wilbur Wright Memorial lecture, are, from left to right: G/C. John Cunningham (British Silver Medal), Mr. A. E. Russell (British Gold Medal), Mr. R. E. Bishop (George Taylor Gold Medal), Mr. A. V. Cleaver (Herbert Ackroyd Stuart Memorial Prize), Mr. R. Hills (Edward Busk Memorial Prize), and Dr. G. S. Hislop (Simms Gold Medal). The presentations, which preceded the lecture, were recorded in "Flight" last week. (The recipients are shown here in an order convenient for photographic continuity.)

TOMORROW'S SOUTH COAST AIR RACE

THE raining-out of the *Daily Express* Challenge Trophy Air Race on August Bank Holiday has brought at least one compensation : when it is flown tomorrow, September 22nd, there will be 11 additional entries, while only one of the original entries has scratched. The list of 63 competitors is given below, with the additional entries in italics. Among the additions is the veteran Hart "MR," entered by Hawker Aircraft and to be flown by F. Murphy.

The course remains as before—from Shoreham Airport along the coast to Newhaven, then a cross-country leg to a right-hand turn at Herne Bay Pier, and so home round the coastline. The start is at 2.30 p.m., and the finish (at West Pier, Brighton will be at approximately 4.20 p.m. The public will be admitted free to Shoreham Airport, except for parking charges (cars 2s 6d, motor cycles 1s, cycles 6d, coaches 10s). Public-address systems at resorts along the coast will relay the progress of the race, and programmes will be on sale.

This time an additional attraction will be a flight round the course, before the race, by a squadron of Naval Attackers.

In addition to the Challenge Trophy, the winner of the race will receive £1,000 and other cash prizes include £500 and £250 for second and third place respectively.

Racing No.	Entrant	Pilot	Aircraft and Registration
3	Capt. R. E. Gillman ...	Entrant ...	Avro Avian IVm (G-ABEE)
4	*P. M. A. Hull ... ...*	*Entrant ...*	*D.H. Gipsy Moth (G-ABAG)*
5	G/C. G. F. K. Donaldson	Entrant ...	Taylorcraft Plus D (G-AHUG)
6	*B. F. Francis ... ...*	*Entrant ...*	*Auster J.4 (G-AIPG)*
7	H. M. Kendall	Entrant ...	Chilton D.W.1 (G-AFGI)
8	Mrs. Y. M. Grace ...	Entrant ...	Taylorcraft Plus D (G-AHKO)
10	D. G. S. Cotter ...	Entrant ...	*Taylorcraft Plus D (G-AHSB)*
12	Personal Plane Services	H. E. Scrope	*D.H. Puss Moth (G-AAZP)*
16	Capt. R. J. Crosfield ...	Entrant ...	Auster Autocrat (G-AJEK)
18	*Avions Fairey ... ...*	*J. O. Matthews*	*Tipsy Junior (OO-ULA)*
19	D. D. Dempster ...	Entrant ...	Chilton D.W.1 (G-AFSV)
21	R. G. Pilkington ...	Entrant ...	Auster V (G-AJVT)
22	P/O. N. D. Norman ...	Entrant ...	D.H. Moth Major (G-ADHE)
26	*Hawker Aircraft, Ltd. ...*	*N. Duke ...*	*Hawker Tomtit (G-AFTA)*
27	T. W. Hayhow ...	Entrant ...	Auster Aiglet (G-AMIH)
28	E. W. Westbrook ...	Entrant ...	Miles Messenger IVa (G-ALBE)
29	S/L. J. A. R. King ...	P/O. M. R. T. Chandler	Miles Hawk Trainer III (G-AKRH)
30	F/L. P. Raymond ...	Entrant ...	Miles Hawk Trainer III (G-AKRW)
31	G. Marler	Entrant ...	D.H. Tiger Moth (G-AMHP)
33	R. Matthews-Naper ...	Entrant ...	Miles Messenger IIa (EI-AFH)
35	W. P. Bowles	Entrant ...	Miles Messenger IIa (G-AJYZ)
37	H. J. G. Turner ...	Entrant ...	Miles Hawk Trainer III (G-ALFE)
38	R. Blackburn	P. G. Lawrence	Miles Messenger I (G-ALAC)
40	Capt. J. H. Christie ...	Entrant ...	Klemm Kl35D (LN-OAV)
41	*Mme. P. Genin ... ...*	*Entrant ...*	*Miles Whitney Straight (F-APPZ)*
44	A. E. Coltman ...	Entrant ...	Miles Hawk Major (G-ADMW)
48	Miss E. L. Curtis ...	Entrant ...	Wicko G.M.1 (G-AFJB)
50	W. P. I. Fillingham ...	Entrant ...	D.H. Moth Minor Coupé (G-AFOJ)
51	Mrs. D. M. I. Cole ...	A. L. Cole ...	Comper Swift (G-ABUS
52	E. Ross	Entrant ...	Miles Hawk Trainer III (G-AITO)
57	*W/C. J. H. Ashton ...*	*Mrs. J. H. Ashton*	*Miles Hawk Trainer III (G-AKMN)*
62	L. C. Marmol	Entrant ...	Percival Proctor I (OO-INT)
63	J. T. Basnett	Entrant ...	Miles Hawk Trainer III (G-AIUE)
64	*H. A. Purvis ... ...*	*Entrant ...*	*Percival Proctor V (G-AGTC)*
65	A. J. Whittemore and Co.	R. A. Peacock	Percival Proctor III (G-AMGE)
66	*Dr. D. F. Little ... ...*	*Entrant ...*	*Percival Vega Gull (G-AFEA)*
67	H.R.H. Prince Alexander of Yugoslavia	Entrant ...	Percival Proctor I (G-AGWV)
68	E. Day	Entrant ...	Miles Hawk Trainer III (G-AKRV)
70	Eagle Aviation, Ltd. ...	J. H. Sauvage	Percival Proctor I (G-AHES)
71	R. Blackburn	H. Wood ...	Percival Proctor I (G-AHVG)
73	A. S. K. Paine	Entrant ...	Percival Proctor I (G-AHNA)
74	K. C. Millican	Entrant ...	Percival Proctor III (G-ALMS)
75	V. Van Damm	Mrs. Z. Irwin	Percival Proctor V (G-AIET)
76	D. J. Bennett	Entrant ...	Percival Proctor V (G-AHGR)
78	J. P. Crowther ...	Entrant ...	Percival Proctor III (G-AKWV
80	W/C. R. H. McIntosh ...	Entrant ...	Percival Proctor I (G-AIEB)
81	*Hercules Cycle and Motor Co., Ltd.*	C. B. Wilson	*Percival Proctor III (G-ALJH)*
82	W. W. Lyle	Entrant ...	Percival Proctor I (G-AHDJ)
83	B. G. Heron	F. C. Fisher	Miles Monarch (G-AIDE)
85	J. G. L. Lignel	Entrant ...	S.F.C.A. Lignel 46 (F-BCZJ)
86	J. G. Garnier	Entrant ...	Nord 1203 Norécrin (F-BESL)
87	P. Genin	Entrant ...	Beechcraft Bonanza (HB-ECS)
89	J. E. Rylands	W. I. Lashbrook	Percival Proctor III (G-AIHD)
90	J. N. Somers	Entrant ...	Miles Gemini III (G-AKDC)
91	*Hawker Aircraft Ltd. ...*	*G. F. Bullen ...*	*Hawker Hart (G-ABMR)*
92	S. A. I. Ambrosini ...	G. Ferrari ...	Ambrosini S.7 (I-EFFI)
93	R. Crewdson	I. A. Forbes	Miles Nighthawk (G-AGWT)
94	F. Dunkerley	Entrant ...	Miles Gemini Ia (G-AKKB)
95	S/L. J. Rush	Entrant ...	Miles Falcon Six (G-AECC)
96	R. R. Paine	Entrant ...	Miles Hawk Speed Six (G-ADGP)
98	Count L. Bonzi ...	Entrant ...	Ambrosini S.7 (I-BOZI)
99	*Hawker Aircraft, Ltd. ...*	*F. Murphy ...*	*Hawker Hurricane 2c (G-AMAU)*
100	Vickers-Armstrongs, Ltd.	J. K. Quill ...	Vickers-Supermarine Spitfire 22

U.S. Operators and the Comet

BEFORE and during Farnborough week, American interest was made apparent in the Vickers Valiant, in Avro 707s and in rubber-deck-landing developments. Last week-end, also, Mr. W. T. Gill, S.B.A.C. president, said that several American airlines were prepared to order de Havilland Comets (presumably Mk IIs) provided that deliveries could be guaranteed by the dates on which United States manufacturers were prepared to guarantee deliveries of piston-engined airliners. He added that it was hoped that the Government would help the industry (with labour and materials) to secure these orders at the same time as military commitments were looked after.

Blackburn and General Aircraft Progress

SPEAKING at the recent annual general meeting of Blackburn and General Aircraft, Ltd., Mr. R. Blackburn, O.B.E., A.M.I.C.E., M.I.Mech.E., F.R.Ae.S. (chairman), referred to the progress being made with the Universal Freighter. Results so far obtained in tests were so promising, he said, that work was now being done on the design of a civil version capable of carrying bulky loads of nearly 20 tons. The firm was financing this venture at present, but the directors considered the expenditure fully justified by the potentialities of the aircraft.

Mr. Blackburn went on to say that work now in hand at Brough, both aircraft and non-aircraft, was insufficient to keep the factory working at full capacity but should enable it to operate profitably for the next year or two. So far, the main aircraft contract from the Ministry of Supply was for the production of the Boulton Paul Balliol; other contracts, both from the Ministry and from aircraft manufacturers, had been accepted.

The position disclosed by the accounts, said the chairman, was much more satisfactory than seemed possible when he addressed shareholders a year ago. Although the trading profit was only half that shown in the previous year it had, in fact, increased from £150,000 to more than £320,000, after taking into account the provisions which, no longer required, had been written back.

Canadian Bristol Appointment

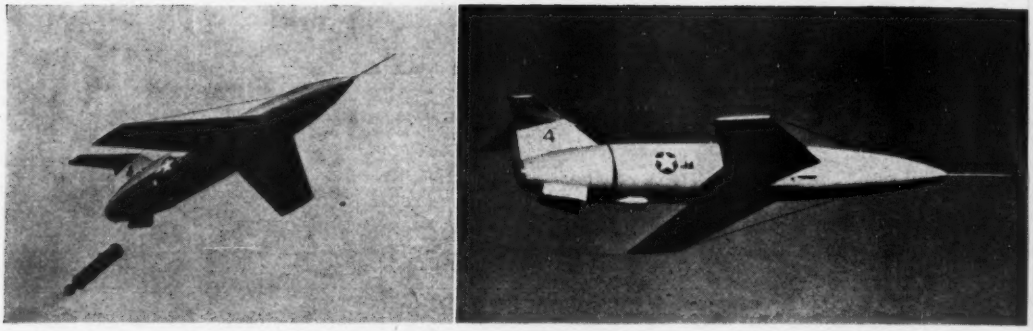
THE appointment is announced of Mr. J. W. Truran, A.F.C., A.R.Ae.S., as special projects engineer to the Bristol Aeroplane Co. of Canada, Ltd. He leaves England for Montreal on October 16th to take up his new appointment.

At one time a Boscombe Down test pilot, Mr. Truran has logged some 1,500 flying hours in 120 different types, ranging from Tiger Moths to Lincolns. He learned to fly at the Bristol Flying School at Filton in 1931, on his return to this country after a long stay in America. He took the R.A.F.O. *ab initio* course under the supervision of Mr. C. F. Uwins, then chief test pilot.

Mr. J. W. Truran, whose appointment to the Canadian Bristol company is announced here.

In 1938 Mr. Truran joined the Air Ministry as a technical officer engaged on flight-test development. Throughout the war he served with the R.A.F. as a test pilot at Boscombe Down and remained there from 1945 to 1947 as senior handling technical officer under the Ministry of Supply.

The next two years he spent in America as West Coast representative of the British Joint Services Mission, returning to England in 1950 to join the M.o.S. as principal scientific officer in charge of transport aircraft and pilotless targets.



UNMANNED : This, the Martin Matador, is to be the equipment of the world's first pilotless-bomber squadron, referred to in a paragraph below

HERE AND THERE

Prince Alexander, B.E.A. Pilot

JOINING B.E.A. this week as a second officer is Prince Alexander of Jugoslavia, who, as a private pilot, has entered for several air races this year. Cousin of ex-King Peter, the Prince was educated in England and served in an R.A.F. communications squadron during the war.

U.S. Turbomecas

AMERICAN acquisition of exclusive U.S. manufacturing rights for the French Turbomeca gas turbines, already forecast in *Flight*, is now officially announced. Continental Motors Corporation is the firm concerned.

Sir H. Tizard's Appointment

RETIRING next March after nearly six years as chairman of the Advisory Council on Scientific Policy, Sir Henry Tizard, G.C.B., A.F.C., F.R.S., F.R.Ae.S., F.Inst.P., has been appointed to the National Research Development Corporation. Sir Henry has had a long and distinguished record in aeronautical science, and from 1933 to 1943 was chairman of the Aeronautical Research Committee. The National Research Development Corporation was established in 1949 to develop inventions in the public interest.

Long Life

THE first gas turbine to attain an officially authorized service life of 1,000 hours between major overhauls is the Pratt and Whitney J-42 Turbo-Wasp, the 5,000 lb s.t. centrifugal unit based on the Rolls-Royce Nene. The U.S. Navy Bureau of Aeronautics authorized the 1,000-hour period as a result of the exceptionally reliable service which the J-42 has given in Grumman F9F-2 Panther squadrons in Korea and elsewhere; an unusual ability to "swallow" bullets, stone and other foreign bodies without serious internal damage is said to have been a big factor in this success. P. and W. now have in production the J-48, a 6,240 lb s.t. unit based on the Rolls-Royce Tay.

Pilotless Bomber

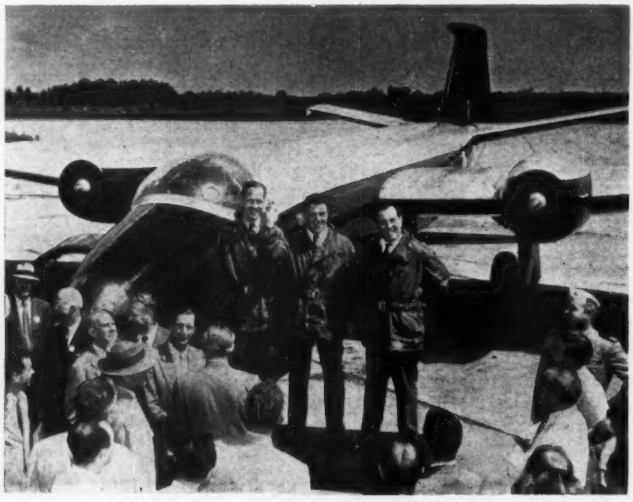
AN official announcement that the first Pilotless Bomber Squadron (Light) would be "activated" at the U.S.A.F. Missile Test Center, Cocoa, Florida, on October 1st, coincided with the release of the first pictures (see above) of the aircraft with which the unit will be initially equipped. It is the Martin B-61 Matador, launched with the aid of a rocket (seen in the first picture at the moment of jettisoning) and propelled to its target by a turbojet. The Matador is probably an expendable weapon, and is intended for tactical use. The new squadron will be supervised in its initial training by 6555th Guided Missile Wing, a component of the Air Research and Development Command. Later it will be brought to operational standard by extensive training under the supervision of the Tactical Air Command.

Token of Appreciation

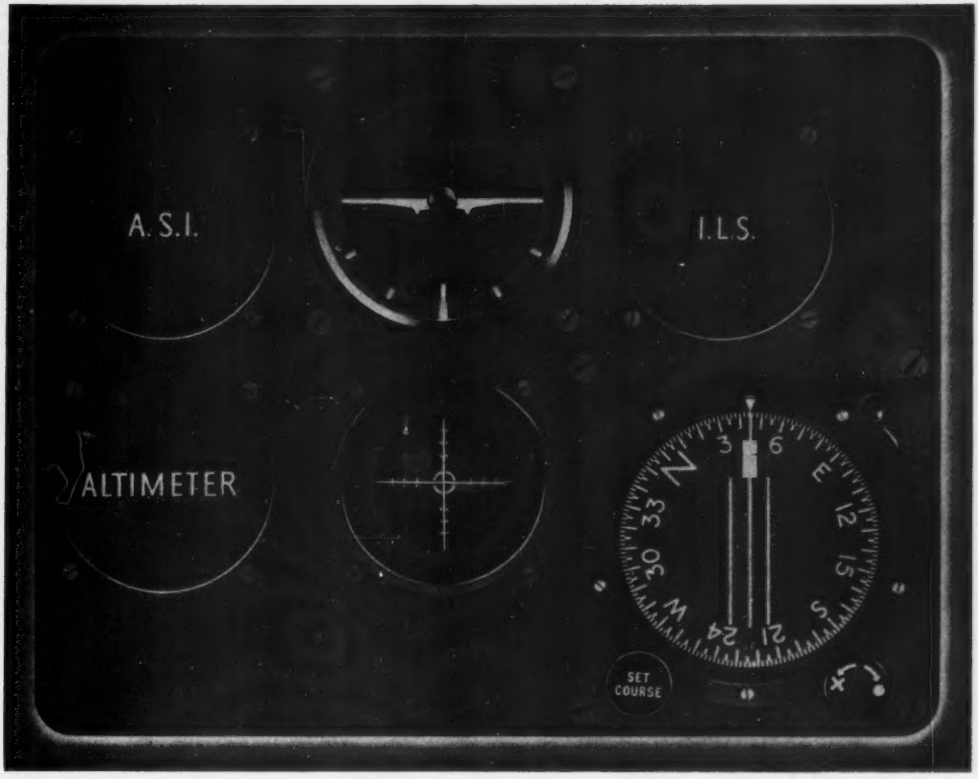
DURING his 22 years as chief test pilot of Vickers Armstrongs, Capt. "Mutt" Summers worked in close technical collaboration with the Dunlop Rubber Co. on wheel and brake development, and on September 12th his friends in the latter organization showed their appreciation by presenting him with a tankard. The informal little ceremony took place during the S.B.A.C. Show at Farnborough, and Mr. J. Wright, general manager of the Dunlop Aviation Division, made the presentation.

Modern Targets

ANOTHER informal gathering in connection with the show took place when the R.F.D. Company entertained a number of guests from home and abroad in London. They learned that the medium-speed winged target displayed at Farnborough is the outcome of co-operation between the manufacturers here and those who first used the target in Sweden (Fairey Fireflies have been used as tugs), and that, to meet the requirement for high-speed target-towing, it has been suggested that the Royal Navy may divert a few Attackers. The R.A.F. have several piston-engined tugs but may also employ Meteors.



WELL CONTENT : This photograph was taken when W/C. Roland Beamont delivered the second Canberra to the Martin works at Baltimore following his Atlantic flight. On his right is R. H. T. Rylands (radio operator), and on his left is D. A. Watson, navigator. In front of the platform, with his back to camera, C. C. Pearson, Martin's president, is talking to Air Chief Marshal Sir William Elliott.



The New Look

As aircraft progress towards all-weather operation the demand for increased accuracy and improved layout of flight instrumentation becomes more insistent. Sperry's latest products to meet these demands, the Gyrosyn Compass and Electric Gyro Horizon, have now been adopted almost universally for military and civil use. These two instruments are now being joined by the Zero Reader master flight instrument, and already B.O.A.C. and B.E.A. have agreed on a standard layout for the panel of their new and future aircraft.

Similar layouts incorporating these three Sperry instruments will be adopted for military and other civil aircraft.

SPERRY

INSTRUMENTS THAT INSPIRE CONFIDENCE

THE SPERRY GYROSCOPE CO., LTD., GREAT WEST ROAD, BRENTFORD, MIDDX. PHONE: EALing 6771

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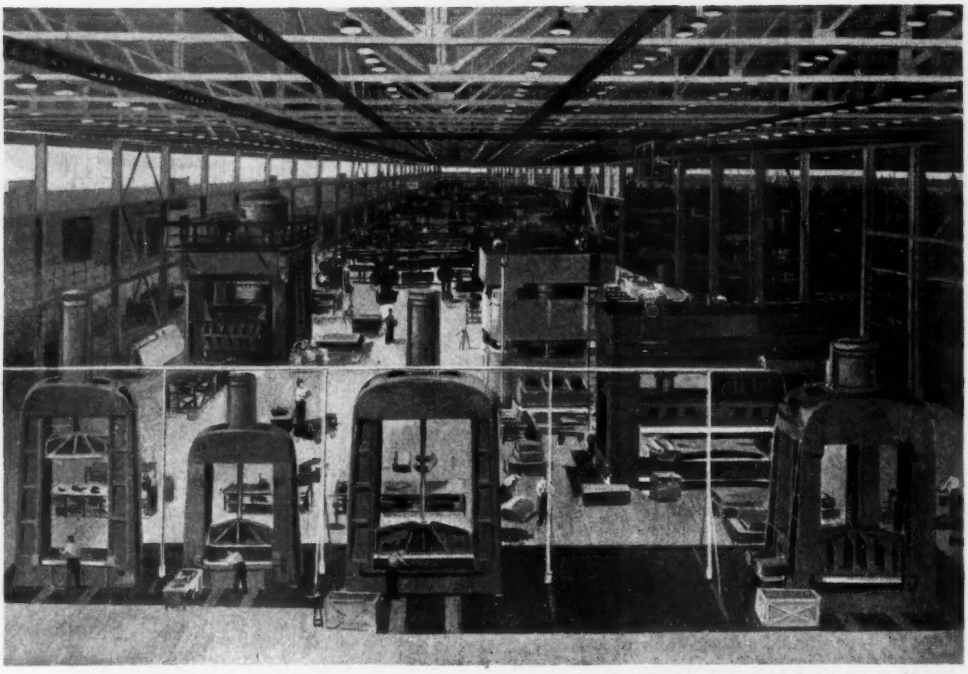


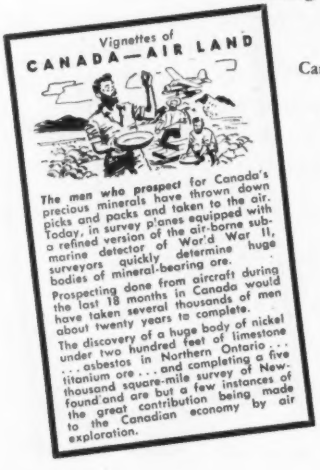
Foreground of one of the bays housing machine operations at Canadair Limited, Montreal.

40 acres FOR AIRCRAFT PRODUCTION

Covering an area as big as a good-sized farm . . . the Canadair plants at Montreal, Canada, house forty acres of machines and equipment now turning out fleet F 86 Sabre* jet interceptors. From immense hydraulic presses and taper milling machines . . . through the long assembly flow lines . . . the finest modern aircraft production machinery fills every acre.

During World War II, the Allies flew military aircraft built by Canadair; and today luxurious Canadair-built four-engined airliners touch down at airfields around the world. Within its 40 acres of factories, Canadair is fully equipped to produce any kind of military or civil aircraft from design to final assembly under particularly advantageous manufacturing conditions.

For further information: European Representative, J. H. Davis, Princes House, 190 Piccadilly, London, W1, England.


Vignettes of
CANADA—AIR LAND
The men who prospect for Canada's precious minerals have thrown down picks and packs and taken to the air. Today, in survey planes equipped with a refined version of the air-borne submarine detector of War'd War II, surveyors quickly determine huge bodies of mineral-bearing ore.
Prospecting done from aircraft during the last 18 months in Canada would have taken several thousands of men about twenty years to complete.
The discovery of a huge body of nickel under two hundred feet of limestone . . . asbestos in Northern Ontario . . . titanium ore . . . and completing a five thousand square-mile survey of New-found-and are but a few instances of the great contribution being made to the Canadian economy by air exploration.

Canadair
LIMITED, MONTREAL, CANADA

*Made under license from North American Aviation, Inc.

"TRAFFIC LIGHTS" are being installed in Boeing KB-29P and KC-97 flight refuelling tankers for the U.S.A.F. The appropriate panels are illuminated in colour to direct the pilot of the receiving aircraft.

EXHIBITION TRADITION: Piloted by Mr. G. E. Long from the R.A.F. Balloon Centre at Cardington, a 28,000 cu ft balloon rises from the South Bank Exhibition. It landed at Waltham Abbey, Essex.

HERE AND THERE . . .

Integrated

THE two Netherlands Navy squadrons which have been training in this country since the beginning of the year are to take part in the autumn fleet manœuvres. No. 4 Sqn. (twelve Fireflies under the command of Cdr. I. A. Ehbel) will operate from H.M.S. *Theseus* and No. 860 (eight Sea Furies, Cdr. I. A. Bruinsma) from H.M.S. *Indomitable*.

Up To Be Shot At

THE Soviet Air Force in Germany is reported to be using Il-10 ground-attack aircraft as "live" targets for light A.A. guns. It may be recalled that an armoured version of the Bell P-63 was developed for a somewhat similar purpose, in conjunction with special frangible bullets.

Atlantic Flight Memorial

FOR several weeks past there has been correspondence in *The Times* on the subject of a memorial to commemorate the 1919 Atlantic flight by Alcock and Brown. A letter from Canada, published on September 12th, now discloses that the Canadian Historic Sites and Monuments Board has the matter in hand: the design of a monument has been approved, and a site has been selected near the take-off point at St. John's, Newfoundland.

Information Study Group

A MEETING of the Association of Special Libraries and Information Bureaux (ASLIB) is to be held on Thursday, September 27th, at R.A.E. Farnborough, to establish an aeronautical information study group to bring together librarians, information officers and others interested in aeronautical subjects. Particulars from ASLIB at 4, Palace Gate, London, W.8.

IN BRIEF

A SHORT SEALAND has been chosen by Admiral Sir Patrick Brind, K.C.B., C.B.E., Commander-in-Chief, Northern Europe, as his personal aircraft for use in Norway.

* * *

Sangamo Weston, Ltd., have recently been accorded Ministry of Supply design-approval for electric measuring instruments for aircraft installation.

* * *

Mr. Charles T. McKinnie has been appointed assistant sales manager of Pratt and Whitney Aircraft with responsibility for all military and civil sales.

* * *

Now retiring is Mr. J. Arthur Simmons, chief buyer at Armstrong Siddeley Motors, Ltd. He first went to work with John Siddeley—later Lord Kenilworth—at the Wolseley Tool and Motor Co. in 1906.

* * *

Mr. Philip Cook and Mr. Frank Ridley have been appointed directors of Daralum Castings, Ltd., of Darlington. Mr. Cook has been promoted to general manager, and Mr. Ridley to secretary of the company and its associate, John Vickers and Sons, master patternmakers, of Darlington.

The Bendix Aviation Corporation, Detroit, has formed an Australian affiliate under the title of Bendix-Technico (Pty.), Ltd.

"FLIGHT" PHOTOGRAPHS

READERS interested in obtaining original prints of *Flight* photographs taken at Farnborough, and of other pictures by our photographic staff, are reminded that these are available from *Flight* Photographic Department, Dorset House, Stamford Street, London, S.E.1, in a variety of sizes. Typical prices are: 6in by 4in, 2s (sepia, 3s 3d); 8in by 6in, 3s (4s 9d); 10in by 8in, 4s (6s 3d); 12in by 10in, 5s (8s); 15in by 12in, 8s 6d (11s); 20in by 16in, 11s 6d (16s); hand-coloured 20in by 16in, £3 3s. Postcards of a large variety of aircraft of the R.F.C., R.A.F., R.N.A.S. and Naval Aviation are also in stock, at 8d each, post free (twelve or more cards, 7½d each).

Flight photographs reproduced in our pages may be identified as such by the indication given in the inscription or in the heading of the article.

The Physical Properties of the Nickel-Iron Alloys is the title of the latest technical publication by the Mond Nickel Co., Ltd., Sunderland House, Curzon Street, London, W.1.

* * *

Secretaries of model-aeroplane clubs will be interested to hear that Shell-Mex and B.P. (Shell-Mex House, London, W.C.2) can now supply, on loan, a limited number of miniature wind-socks on 6ft masts.

* * *

A contract of over £3 million in value has been placed with John Laing and Son, Ltd., for airfield construction at the National Aeronautical Establishment, near Bedford. The most modern concreting plant in the world, they state, will be used.

* * *

Aerocontacts, Ltd., Gatwick Airport, Surrey, have issued the third edition of their "Contactalogue" of aircraft of the many types which their sales department handles. Prepared in three languages (English, French, Spanish) by Mr. M. J. Spence, sales manager, the publication incidentally serves as a useful price and specification guide.

FAWLEY OPEN

A Vital Addition to U.K. Resources

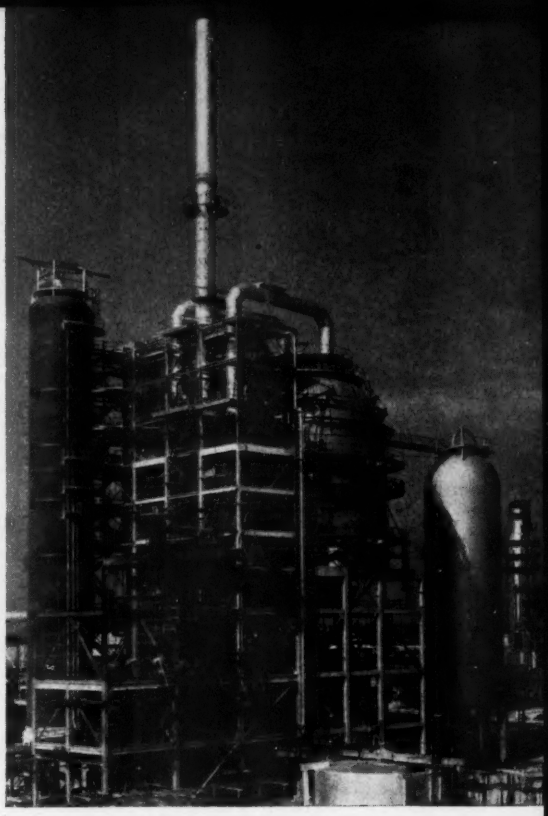
COMPLETED four months ahead of schedule, what has been perhaps the greatest structural engineering undertaking in Europe since the war, the new 450-acre Esso refinery at Fawley, on Southampton Water, was last Friday, September 14th, formally opened by the Prime Minister, the Right Hon. C. R. Attlee.

The importance of the whole project can be gauged from the basic facts that the new refinery will supply nearly 30 per cent of the present total demand for petroleum products in the British Isles and will save the expenditure in foreign exchange of more than two million dollars every week. As it is, an output of more than a million gallons of petrol a day is scheduled within the next two to three months.

As is generally realized—in very broad terms—the end-products of the various crude-oil refining processes are distributed over a very wide ambit, and embrace solvents and gases, soaps and ointments, asphaltes, emulsifiers and the heaviest fuel oils, these being random derivatives typical of the extraordinary range covered. Fawley, however, will, in the main, produce high-quality petroleum products and, to this end, one of the largest and most impressive components of the refinery is the catalytic cracking plant. Cracking is the colloquial term used to define the breaking down of large molecules, such as those of gas oil and fuel oil, into the smaller molecules of gases and motor spirit, by subjecting them to very high temperatures. A higher yield of better quality spirit can, however, be made when a catalyst is added, a catalyst being a substance which causes other substances to change chemically without being changed itself. The "cat cracker" uses a catalyst so finely powdered that it flows like a liquid, circulating and intermingling with the oil vapours fed into the unit. As the cracking reaction progresses, incoming oil vapours and fresh catalyst keep forcing the cracked vapours and the blackened catalyst to the top of the reactor, where they are separated. The clean cracked vapours are piped off for further processing, and the carbon-coated catalyst falls into a regenerator, there to be burned clean by a stream of air, finally to begin the cycle all over again.

In view of the serious situation regarding the present shortage of sulphur, the work of the hydro-desulphurization and sulphur plants at Fawley is of major importance. The hydrogen-sulphide which is released in the process of refining crude oil will be converted into 99.5 per cent chemically pure rock sulphur and, when in full operation early in 1953, no less than 12,000 tons of sulphur will be produced by the plant annually.

Fawley, when fully completed, will have cost £37,500,000, and this immense sum will be borne entirely from the financial resources of the Esso Petroleum Co. Construction of the refinery has been completed in just over two years (site clearance began in July, 1949), and at the peak period of construction more than 5,000 men were engaged on the work; the permanent staff of the refinery will number about 2,500. The new marine terminal which serves the refinery has a 3,200ft-long jetty, which provides simultaneous berthing accommodation for four of the largest oil tankers afloat, or contemplated, as well as for smaller coastal tankers. The architectural planning of the whole project has been undertaken with the most detailed care, and although to many people the structures of the various plants have a functional beauty all of their own, there are also those who cannot help but regard the incursion of modern industry as detracting severely from the amenities of the countryside. In compensation, 4,500 new trees have been planted.



Largest of the individual plants at the refinery, the catalytic cracker will shortly be producing 1,000,000 gallons of petrol every day.

LANDING WITHOUT WHEELS

EARLY-ARRIVING guests at Farnborough on Wednesday September 12th—if they happened to be looking in the right direction—were rewarded by a long-distance view of a rubber-deck landing demonstration.

A number of V.I.P. cars, at least half American, began to collect beside the rubber-deck site on the airfield shortly after 10 a.m., and soon afterwards arrester gear was seen to be erected and an inspection of the equipment was carried out. Next, a modified Sea Vampire took off and, after a low circuit, made a dummy run over the deck. A second circuit followed and this time a long, low approach was made with wheels up and hook trailing. At the last moment the pilot broke off to port, apparently not being satisfied with his line of approach.

A third circuit was made, again with a very low, flat approach, full flap and a fair amount of power. Slowly as the aircraft came in, the speed still seemed incredibly high for there to be any possibility of a landing on the small area of sprung deck; and, in spite of the reason being known, the absence of wheels on an obvious approach to land was still most disturbing to the onlooker.

The actual arresting and landing came so quickly that several seconds elapsed before the official spectators fully appreciated what had happened and started to move forward towards the aircraft. At one moment the Vampire was flying over the arrester cable at some 90 kt; at the next it was snatched out of the air and held above the mattress. And as quickly again it seemed to plunge slightly nose-down on to the mattress, with a puff of bluish smoke, spray or dust. With a slight bounce it finally settled down on its belly and rolled on to its starboard wing-tip. The Goblin turbojet was still running, but the pilot stopped it as soon as he had "arrived." Its only protest about the treatment it was receiving was a puff of blue smoke. The whole arrival had taken up about three Vampire-lengths.

To date little has been released about the experiments with "rubber stoppers" and this demonstration was by no means for general consumption. Ultimately, as a result of such developments, it may be possible to save the weight (at least 7 per cent of the total), the complication and the cost of landing gear on some classes of naval aircraft by launching them with the aid of a catapult and landing them on a mattress in a similar manner to that described above.

BOOKS RECEIVED

Storage of Petroleum Spirit, by H. E. Watts. Charles Griffin and Co., Ltd., 42, Drury Lane, London, W.C.2. Price 28s.

An Introduction to the Theory of Control in Mechanical Engineering, by R. H. Macmillan. Cambridge University Press, Bentley House, 200, Euston Road, London, N.W.1. Price 30s.

Applied Mechanics for Engineers, by Sir Charles Inglis. Cambridge University Press, Bentley House, 200, Euston Road, London, N.W.1. Price 42s.

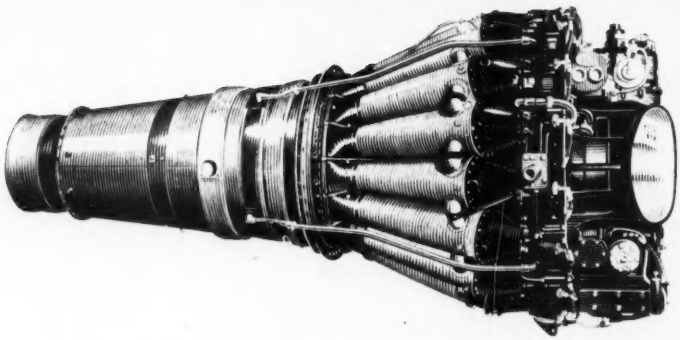
exceeding all expectation . . . . .

AVRO 707

A V ROE & CO LTD MANCHESTER (Member of the Hawker Siddeley Group)

GOBLIN

the power unit of the Vampire Night Fighter



A reliable, established engine with a decade of development behind it, the Goblin is in service in thousands from Sweden to South Africa, from Canada to Singapore and Switzerland. It is in full production at home and abroad to make its contribution to defence needs

DE HAVILLAND

DE HAVILLAND ENGINE COMPANY LIMITED, EDGWARE, MIDDLESEX, ENGLAND

KEEPING THEM FLYING

British and Australian Commercial-aircraft Utilization Compared: Some B.E.A. Results

By B. S. SHENSTONE

IN the most interesting article entitled "This is Utilization," in *Flight* of August 17th, some figures are quoted which I knew before, but some further useful information is also included. The following, one notes, are given as important factors in achieving high utilization: (1) Right stage-distances; (2) quick turn-round times; (3) traffic available; and (4) the well-organized maintenance system.

I think we would all agree that the right stage-distances on which to achieve a high utilization are long ones. B.E.A. is essentially a short-haul operator and there are very few stage-distances which are long enough to be called "right." Our average stage is 223 miles (357 miles for Vikings).

With B.E.A.'s short hauls, the loss in utilization as a result of turn-round delays is, of course, considerable. Most of our stops are not transit stops, but are at terminals where the aircraft is emptied and re-loaded, and there are Customs formalities and paper work to deal with, of a kind not found on routes operating inside the U.S.A. or Australia.

During the past year we have made progress in increasing the utilization rate of B.E.A. aircraft, as the graph below (Fig. 1) shows. However, European conditions are such that B.E.A.'s chief operations are between 9 a.m. and 10 p.m. For relatively short trips, people apparently do not like to get up too early in the morning, nor do they like to arrive on the Continent too late at night, because hotel accommodation may be difficult. In addition, in many places one cannot arrive late at night because the airports are not equipped for night operation in bad weather. B.E.A. does, however, maintain a policy of operating as many additional services as possible after dark, including excursions to night spots, such as Paris, Amsterdam, Nice, Zurich and Geneva. We intend to increase these services as much as possible, which will, of course, help the utilization.

As a result of these things (and others which there is no space to mention) the peak utilization of the B.E.A. Viking fleet during the past year has been up to a rate of over 2,300 hours per year in the summer, but has dropped to a lower figure in the winter. The actual utilization over the whole of last year was 1,883 hours per aircraft, including all the 45 Vikings owned by B.E.A. The most a single aircraft actually accomplished was 2,108 hours in the year April 1950/March 1951.

In the table below are some examples showing the hours on the six Vikings which flew the most. The utilization we have accomplished cannot be said to be large compared with those obtainable in Australia, but the conditions, unfortunately, are not nearly so favourable.

B.E.A. VIKING UTILIZATION

	Total Hours (April 1950—March 1951)
G-AHPS	2,108
G-AIVF	2,049
G-AIVI	2,044
G-AJBO	2,038
G-AJDJ	2,036
G-AJDK	2,031

Average Daily Flying Times: July-December 1950

Regn.	July	August	September	October	November	December
G-AJBU	7.8	5.9	7.2	5.3	6.1	4.8
G-AIVF	6.0	6.8	6.1	6.2	6.1	5.8
G-AJDK	6.3	5.9	6.5	6.2	5.5	5.5

PUBLICATION in our pages (August 17th) of an article in which attention was drawn to the remarkable aircraft-utilization figures regularly being obtained by certain Australian operators has prompted the accompanying informative contribution from Mr. B. S. Shenstone, M.A.Sc., A.F.I.Ae.S., F.R.Ae.S., who is chief engineer of British European Airways. In it he shows that, in spite of circumstances that impose a severe handicap on the British short-haul operator, B.E.A. are now obtaining results that bear comparison with those of the more favourably placed Commonwealth concerns. Mr. Shenstone, it will be remembered, read a paper on "Engineering Problems of Aircraft Operation" at the recent Anglo-American Conference.

Referring to Point 4, the well-organized maintenance system, it is very difficult to prove easily whether one system is better than another, particularly if different aircraft are being considered. However, the above-mentioned article gives some interesting figures about T.A.A., and perhaps I may be permitted to indicate our equivalent figures in B.E.A.

In Fig. 2 are shown the engine hours per unscheduled or precautionary engine change for the past couple of years for both the Viking and the Dakota. If these are studied in conjunction with the T.A.A. figures it will be seen that although the Hercules engines in the Vikings do not show up quite so well as the R.2800-CA-15 (2,600 hours *versus* 3,598), they compare considerably better than the R.2800-CA-18 (2,600 hours *versus* 1,166), and better than the B.E.A. Dakotas' 1830 (2,300 hours). In most cases the necessity for these precautionary changes is discovered on the ground, and the number of featherings—that is, faults requiring stoppage of the engine in the air—is very much fewer.

In Fig. 3 are shown the hours per feathering for the same two types of engine and aircraft. This indicates that there are about 5,300 engine hours per feathering, which figure is twice as good as that for all the premature removals. Again, I would point out that many of the featherings which occurred were not caused by trouble in the engine itself, but were a result of faults in the accessories.

The Hercules engine over the past year or so has shown a great deal of improvement in its endurance qualities, as is indicated in Fig. 4, which shows that when one ignores the accessories and considers only breakage or failure of parts of the engine itself (such as valves, pistons, bearings, castings, etc.) the figure is very much better (15,500 hours per failure).

In the curves given are included all the removals we have had, except for an epidemic last winter when, for very complex reasons, we had to remove a large number of Hercules engines over a relatively short period.

In *Flight's* article, mention is made of the fact that work in the T.A.A. shops is planned entirely to the needs of the timetables. This is also true in B.E.A.; for instance, nearly all the base maintenance required is completed during the five-day working week, leaving the whole fleet available for operation during the week-end—the peak period. It must also, however, be realized that the timetables are planned, wherever possible, to encourage economic maintenance, and that the results achieved are the product of team-work between the engineers and the route and schedule planners.

The now well-established B.E.A. premium bonus scheme is operated on all base maintenance work, and the results achieved have been phenomenal—as in Australia, the target man-hours are

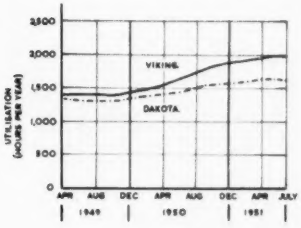


Fig. 1. Annual revenue-earning utilization for B.E.A. Viking and Dakota (moving annual basis).

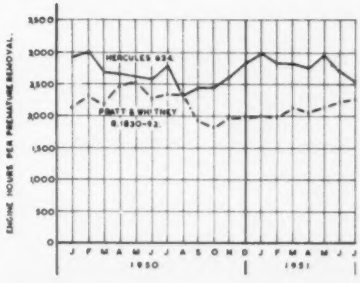


Fig. 2. B.E.A. engine hours per unscheduled removal (moving annual basis).

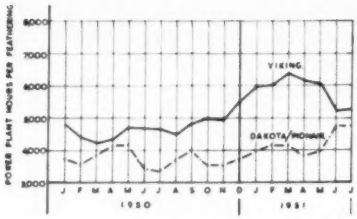


Fig. 3. Involuntary featherings on Viking and Dakota power units (moving annual basis).

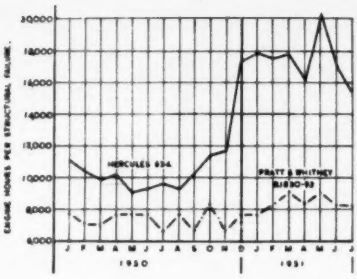


Fig. 4. B.E.A. engine hours per structural failure (moving annual basis).

KEEPING THEM FLYING...

almost "fanatically" reduced. As a comparison with the Australian figures, B.E.A.'s target estimate for a routine DC-3 daily inspection is two-and-a-half man-hours and, including the unexpected snags that may or may not arise, averages three-and-a-half hours over a long period.

Considering the number of days-off-service for the Viking fleet, the following may be of interest. Vikings never undergo a major overhaul, because they are operated on a system of progressive overhaul, that is, they are not laid up every couple of years and completely dismantled, but the work is done in small instalments at certain planned periods throughout the life of the aircraft, which is consequently never off service for very long at any one time.

If we take the whole Viking fleet and consider the work done at base, i.e. checks at 200, 400 and 800 hours, we find that for the first six months of 1951 the average number of days off service per month is 2.36, which is 28.3 days per year. This includes all regular base work, but sometimes aircraft develop snags between checks and have to be off service. Most of this snag time occurs at Northolt, and averages over the same six months 0.25 hours per month per aircraft. Off-service time caused by snags at outstations is not included here, mainly because it is not immediately available; but it is not a critical factor.

Hence, the total time off service for aircraft per month is 2.61 days, which comes to 31.3 days off service per year. The T.A.A. figure for the four Convairs quoted was about 30 days.

In the figures I have given above, I have not included the time spent in doing minor checks, which are done at night with no interference with the services.

To complete the picture, the breakdown of typical 24-hour periods spent by two Viking aircraft during August of this year was as shown in Fig. 5.

Thus, although the time off service for Viking aircraft is of the same order as that for Convairs, and the power-plant dependability is also very good, the utilization is still down. It is down not because of maintenance, but because of the existing European conditions—the short stages, the unco-ordinated airports, the Customs barriers, the scarcity of radio and night-flying aids, and the uneconomic routes forced upon us by the varied countries we have to fly through, over and even around.

All these factors which work against a high utilization are being tackled and, with our new Elizabethan class, where utilization is of even more importance than the cheaper and more elderly types, we hope to work up to a figure of over 2,000 hours p.a.

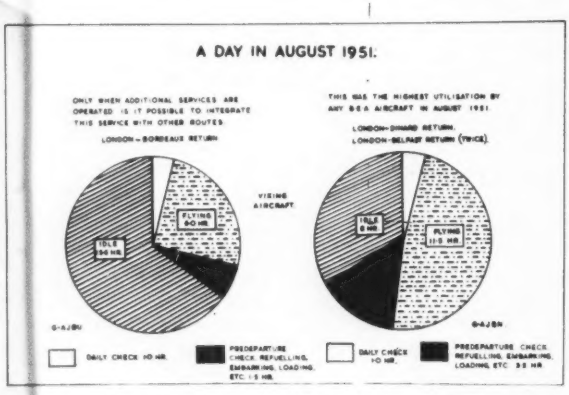
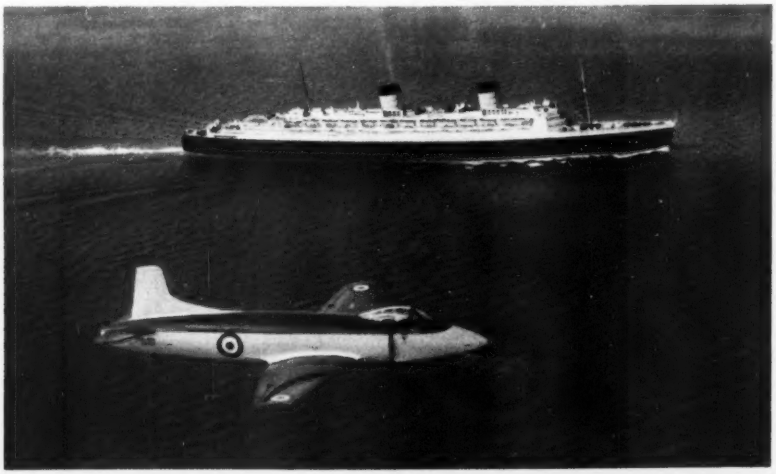

A DAY IN AUGUST 1951.
ONLY WHEN ADDITIONAL SERVICES ARE OPERATED IS IT POSSIBLE TO INTEGRATE THIS SERVICE WITH OTHER ROUTES.
LONDON – BORDEAUX RETURN
FLYING 8·0 HR.
TAXI 3·54 HR.
G-AJBV
VIKING AIRCRAFT
THIS WAS THE HIGHEST UTILISATION BY ANY B.E.A. AIRCRAFT IN AUGUST 1951.
LONDON–DINARD RETURN.
LONDON–BELFAST RETURN (TWICE).
TAXI 0 HR.
FLYING 11·5 HR.
G-AJBN
DAILY CHECK 1·0 HR.
PREDEPARTURE CHECK, REFUELLING, EMBARKING, LOADING, ETC. 1·5 HR.
DAILY CHECK 1·0 HR.
PREDEPARTURE CHECK, REFUELLING, EMBARKING, LOADING, ETC. 3·5 HR.

Fig. 5. Graphic representation of contrasting 24-hour employment for two B.E.A. Vikings.

MERCHANT NAVY AND NAVY-THAT-FLIES



In this striking picture, the Cunarder "Queen Elizabeth" is the expression of Britain's pre-eminence in merchant shipping, while the Supermarine Attacker jet fighter (Rolls-Royce Nene) is a symbol of the Royal Navy's resolve to secure the finest equipment for its carrier-borne squadrons.

LATEST POWER DEVELOPMENT FOR JET AIRCRAFT

THE SNARLER rocket motor★ makes history

★

INDEPENDENT OF ATMOSPHERIC OXYGEN, THE LIQUID PROPELLANT ROCKET MOTOR SUCCESSFULLY DEVELOPED BY ARMSTRONG SIDDELEY IS THE NEXT LOGICAL STEP IN AIRCRAFT PROPULSION

ARMSTRONG SIDDELEY MOTORS LIMITED

COVENTRY

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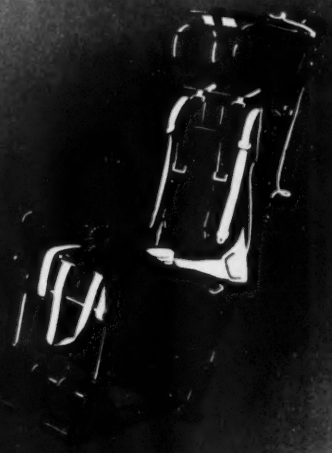


The Martin - Baker
Patent Ejection Seat
continues - with distinction - unrivalled
as the standard seat for both the
Royal Navy and the R.A.F.

MARTIN-BAKER

Ejection Seats

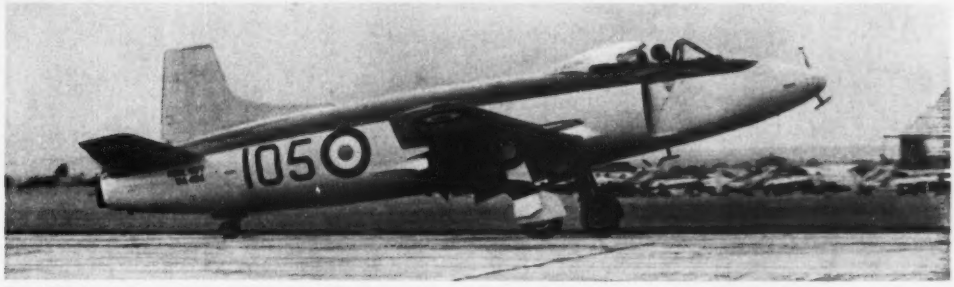
MARTIN - BAKER AIRCRAFT CO. LTD., HIGHER DENHAM, NR. UXBRIDGE, MIDDX.

NAVAL AVIATION VARIETY

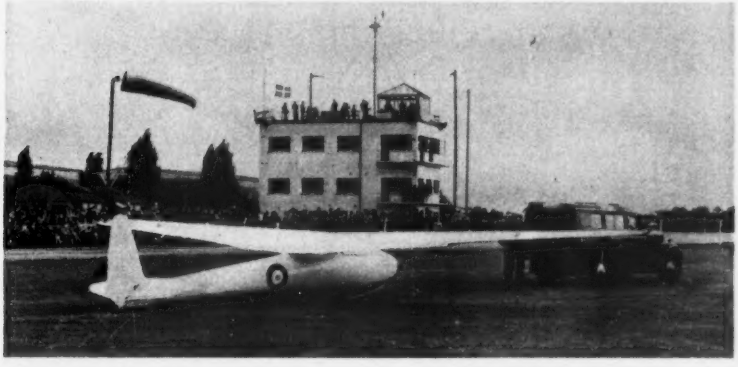
THESE "Flight" photographs give some idea of the variety of entertainment laid on by H.M.S. "Peregrine" (R.N. Air Station Ford) on Saturday, September 8th. A report of the display appeared in last week's issue.

A visiting Lincoln makes a low run with starboard engines feathered.

Fireflies in formation pass over the "bridge."



One of 800 Squadron's newly acquired Supermarine Attackers taxies after taking part in some impressive formation flying.



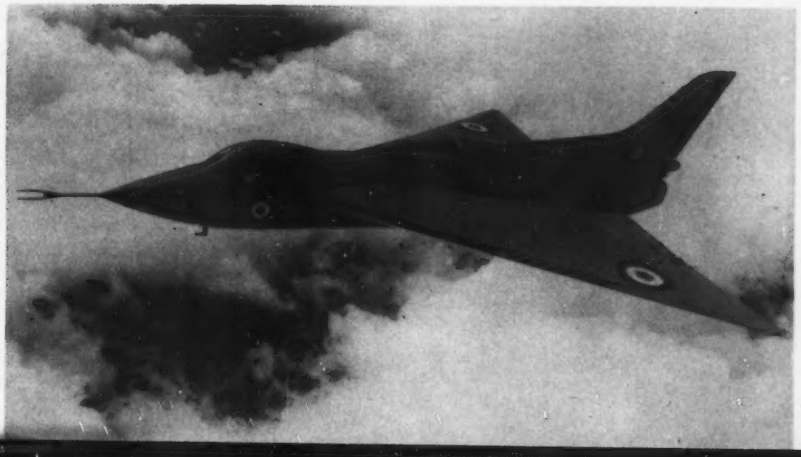
(Above) Lt. Mearns, of 703 Squadron, whose Sea Vampire won the race. (Below) Naval versatility even extended to a Judo exhibition.

(Above) Lt. Cdr. J. S. Sproule's handling of this trim Olympia sailplane was much appreciated by the spectators. Below) Two Seafires of 1832 Squadron demonstrate take-off with and without R.A.T.O.G.

GLIMPSED as it flashes between tufted clouds, its new, large-size roundels boldly proclaiming its nationality, is the new Hawker P.1067 (right). Like the Vickers-Supermarine Swift F.1, seen posing for its photograph below, the 1067 is an intercepter fighter for the R.A.F. The four-jet bomber is the Short S.A./4—likewise with Rolls-Royce Avon power—and the delta-wing research aircraft is the Avro 707B.

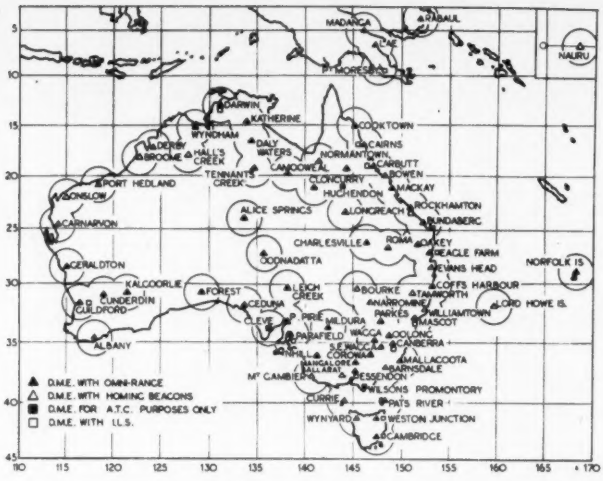
FASHIONED FOR THE NE

W ERA



AntipoDME

Distance-measuring Equipment Now Developed in Australia



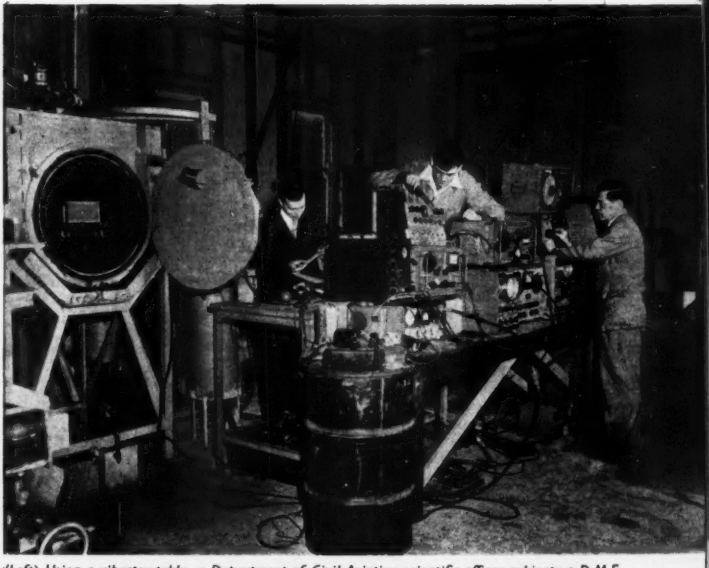
The positioning of the 95 D.M.E. beacons to be installed in all but the most remote areas of Australia. The inset key indicates the type of beacon at each site.

FOLLOWING on the article which appeared in our issue of August 31st, describing distance-measuring equipment, these notes on Australian activity in this field are of interest. The equipment developed in England by Ferranti, Ltd., operates at 1,000 mc/s, whereas the Australian apparatus—the joint work of the Commonwealth Scientific, Industrial and Research Organization, the Department of Civil Aviation, and research engineers of Amalgamated Wireless (Australasia), Ltd.—operates in the 200 mc/s band.

Some three years ago, world-wide tenders were invited for the building of a network of 90 beacons sited throughout the three million square miles of Australia and New Guinea. The tender of Amalgamated Wireless (Australasia), Ltd., the largest manufacturer of radio and associated equipment in Australia, was accepted. The planned installation is shown in the map of the Continent above.

The equipment originally evolved in the laboratories of Australia's C.S.I.R.O. has undergone many changes in the research and development departments of Amalgamated Wireless in preparing for large-scale production. The equipment today has 12 channels with a potential of 24. By means of a selective switch the pilot can read at will his distance from any beacon within 100 miles, and be informed audibly as well as by neon flashes of the identity of the beacon he has selected.

Acceptance and flight tests of prototypes are now in progress. The dictum of the first I.C.A.O. meeting at which such an aid as D.M.E. was discussed—"to function under all flying conditions"—is being rigidly followed. These

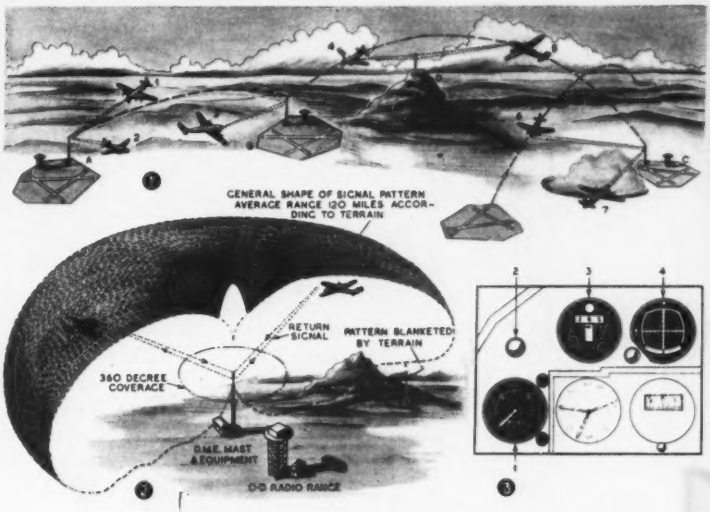


(Left) Using a vibrator-table, a Department of Civil Aviation scientific officer subjects a D.M.E. selector switch to a two-hour endurance test. (Above) Test equipment installed by Amalgamated Wireless engineers for the acceptance trials required by the Department of Civil Aviation. On the left, an airborne D.M.E. unit is seen in an altitude-and-low-temperature chamber.

(1) *Typical facilities provided by the installation:—*
- (1) and (2) Incoming and outgoing aircraft interrogating beacon at airfield A.
- (3) Aircraft approaching airfield B receives continuous distance indication and beacon-identification; continuous bearings are received from the omni-directional range.
- (4) Aircraft begins let-down when beacon D is passed.
- (5) Aircraft flying from C to B uses beacon D because terrain blankets beacon B.
- (6) Aircraft flying offset computer course can check track with any beacon within range.
- (7) Beacon at airfield C, in conjunction with omni-range, indicates minimum height for safe terrain-clearance in bad visibility.

(2) *Visual representation of the coverage provided by a single D.M.E. beacon. This drawing may be visualized as resembling a vertically bisected mushroom-head.*

(3) *The pilot's D.M.E. instruments:—*
- (1) Distance indicator.
- (2) Coding lamp.
- (3) Radial selector.
- (4) Course deviation indicator.



first units are being subjected to tests in temperature ranges from minus 40 deg C to 55 deg C. They are working at altitudes up to 20,000ft and are being subjected to severe "bump" tests which involve 2,000 half-inch falls an hour.

Other exhaustive tests are made on vibration and swinging machines, both designed to create the most violent conditions and treatment that the apparatus is likely to meet under the worst conceivable flying conditions possible in service.

TWO NEW BOOKS

A New History of the Wright Brothers' Experiments: and a Novel about U.S.A.F. Bombing

"Miracle at Kitty Hawk—The Letters of Wilbur and Orville Wright," edited by Fred C. Kelly. Farrar, Straus and Young, Inc., 101, Fifth Avenue, New York, 3, U.S.A. Illustrated. $6.00.

SOME years ago the vivacious Miss Betty Hutton made a film entitled *Miracle of Morgan's Creek*—the miracle being the sudden arrival of—if I remember rightly—five lusty offspring. But the production of the world's first successful aeroplane by Wilbur and Orville Wright at Kitty Hawk in December, 1903, was neither sudden nor a miracle, and Mr. Kelly has done the Wrights an injustice in titling this collection of their letters *Miracle at Kitty Hawk*. The letters themselves show only too well that the Wrights' success was the logical, well-earned result of three years of painstaking research and practical experiment, with all the usual accompanying setbacks and discouragements.

Apart from that title, Fred Kelly has done a first-class job in skimming the cream of nearly 600 letters from 30,000 items which make up the Wright Brothers Collection in the Manuscript Division of the Library of Congress, and presenting them in palatable form. He explains in his preface that his main object was to let the Wrights' own letters tell the story of their achievements and reveal their personalities, providing the equivalent of an autobiography. Some enthusiasts will regret his decision to omit letters dealing with the more technical problems encountered by the Wrights; but it was wise in a book aimed at the general reader.

Some letters reflect the humour and simple tastes of Wilbur and Orville Wright; such as one from France by Orville to his father, Bishop Milton Wright, in 1907, which commented: "We have been real good over here. We have been in a lot of churches, and haven't got drunk yet!" But the overwhelming impression they give is of the brothers' confidence in the design of their biplane. They developed it so carefully and patiently that Wilbur was able to write: "I have no expectation of being hurt. I think the danger much less than in most athletic games." Nor did they get wildly excited when they finally achieved free, sustained, and controlled flight on December 17th, 1903, regarding that success merely as a logical milestone in their work. If anything, they were too confident, for five years later they still refused tempting business offers for their invention, in the belief that nobody else would fly successfully until, at the earliest, 1913, and that they would do better if they waited.

Letters concerning negotiations with the U.S. Army and foreign governments prove that red tape is no monopoly of our present age. Nineteen days after the Wrights made a 38-minute flight of 24½ miles, on October 5th, 1905, the U.S. Board of Ordnance and Fortification wrote that it did not care to formulate any requirements for the performance of a flying-machine until one was produced which by actual operation was shown to be able to "produce horizontal flight and to carry an operator."

Helicopter enthusiasts will hardly approve Wilbur Wright's views on rotating-wing aircraft, expressed in a letter written in 1907. "Like all novices," he writes, "we began with the helicopter in childhood, but soon saw that it had no future and dropped it. The helicopter does with great labour only what the balloon does without labour, and is no more fitted than the balloon for rapid horizontal flight. If its engine stops it must fall with deathly violence, for it can neither float like the balloon nor glide like the aeroplane. The helicopter is much easier to design than the aeroplane, but it is worthless when done."

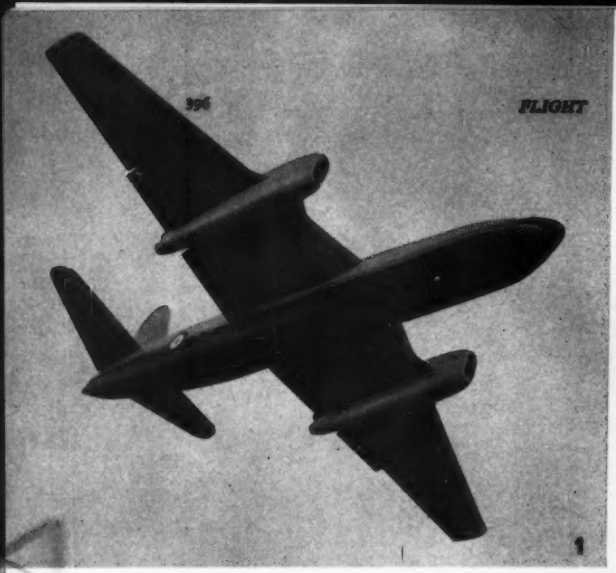
There is much to amuse, and very much to interest in this book, which is a worthy successor to Mr. Kelly's earlier standard biography of *The Wright Brothers*. J.W.R.T.

"The Sky is a Lonely Place," by Louis Falstein. Rupert Hart-Davis, 36, Soho Square, London, W.1. Price 10s. 6d.

THIS novel tells the story of ten men with a single aim in life —to survive their tour of 50 bombing missions in Europe so that they can return to the United States. They form the crew of a Liberator of the U.S. 15th Air Force, based in Italy in the summer, autumn and winter of 1944, and their lives and deaths are seen through the eyes of the aircraft's rear-gunner—the only one who reaches the elusive half-century.

It is not a pleasant story; but war is not pleasant, and Mr. Falstein's narrative rings so true that it does not require the assurance that "some of the events described are real." Seldom has any author been able to give a more vivid picture of the fear, tedium and hell of flying endless missions in daylight over some of the most heavily defended targets in Europe. The reader can almost imagine himself one of the crew of *Flying Foxhole* on its first mission over Vienna, with cannon shells ripping through the fuselage, the air thick with the reek of explosive and noise of battle.

This is no book for the squeamish. The drama of fog, flak, crashes, death, fear and compassion which punctuates the operational narrative is matched by the squalid violence of the crew's off-duty *affaires* with the demoralized, debased, hungry and bewildered peasants among whom they lived. Their language and actions are often excessively crude, and accounts of their behaviour in combat are seldom flattering; yet one is left with the uneasy conviction that *real* men, no better and no worse than these, flew the bombers which did so much to hasten victory. This is no mean achievement in a first novel.



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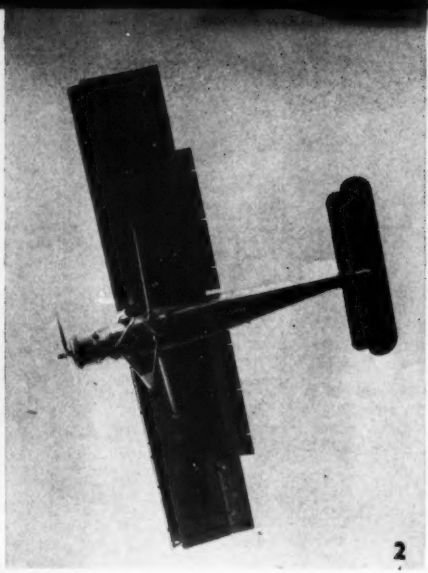

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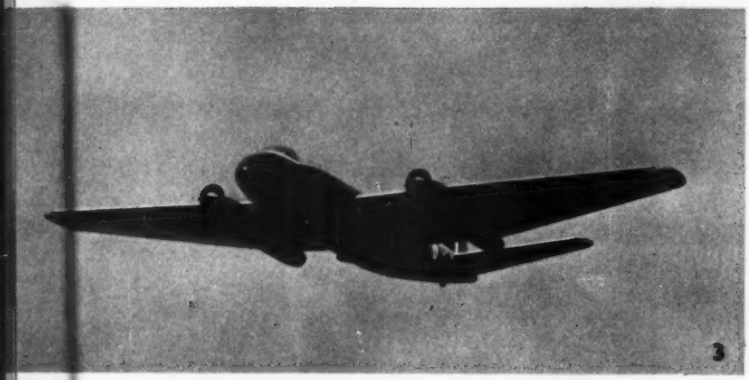

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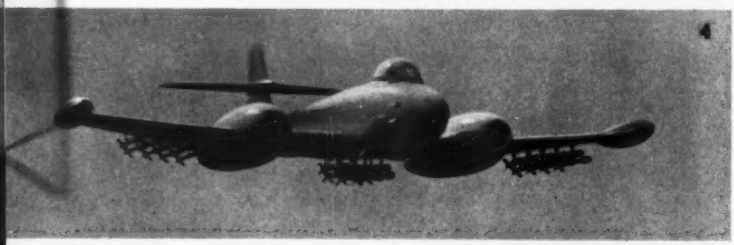

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5

IN ACTION

A Mélange of "Flight" Camera

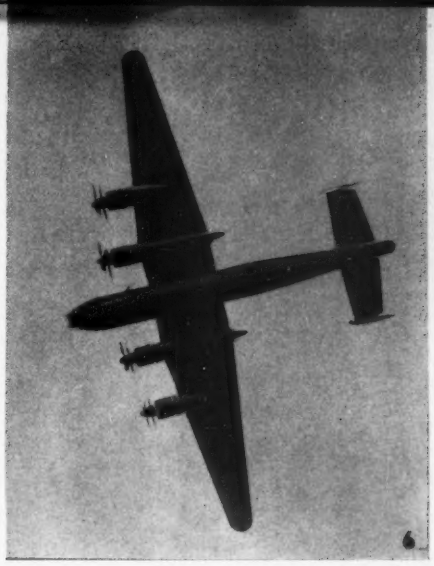
(1) *Short S.A./4 (four Rolls-Royce Avons).*

(2) *Scottish Aviation Pioneer (Alvis Leonides).*

(3) *English Electric Canberra (two Armstrong Siddeley Sapphires).*

(4) *Gloster P.V. Meteor (two Rolls-Royce Derwents).*

(5) *Short Sealand (two D.H. Gipsy Queens), with the Brabazon, Ambassador, Varsity and Chipmunk in evidence.*



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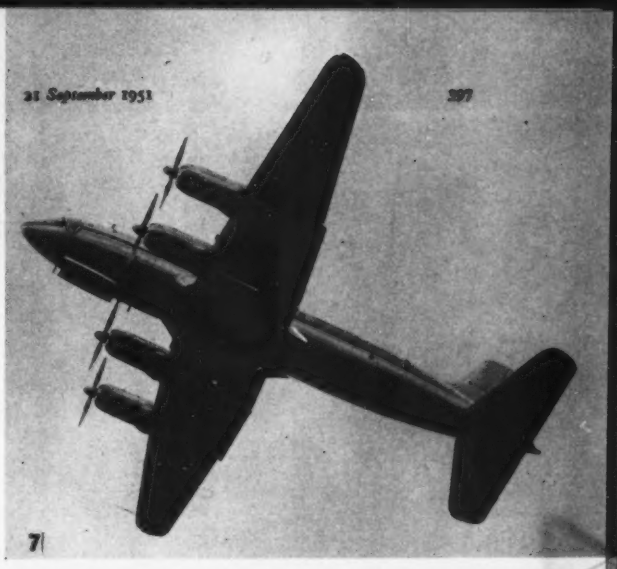

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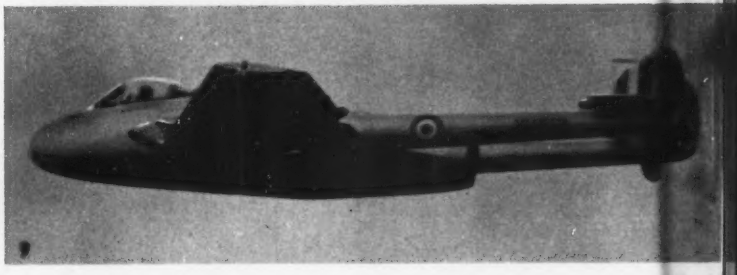
AND REPOSE

Impressions from Farnborough

8



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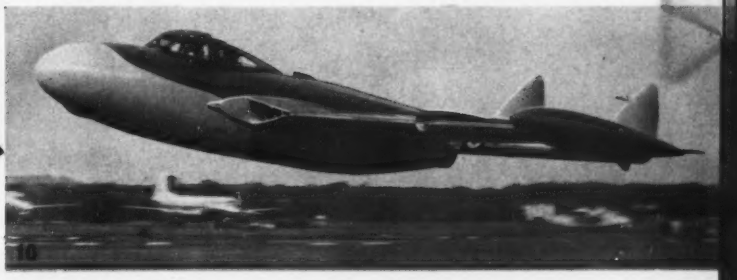

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(6) *Avro Shackleton (four Rolls-Royce Griffons).*

(7) *Handley Page Hermes V (four Bristol Theseus).*

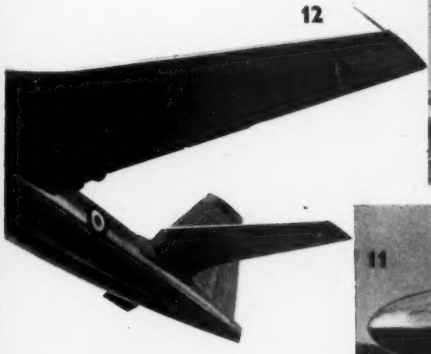
(8) *A.W. (Gloster) Meteor N.F.11 (two Rolls-Royce Derwents).*

(9) *de Havilland reheat Venom (D.H. Ghost).*

(10) *de Havilland Sea Venom N.F.20 (D.H. Ghost).*

(11) and (12) *Ground and air studies of the Vickers Valiant bomber, powered with four Rolls-Royce Avons.*

12



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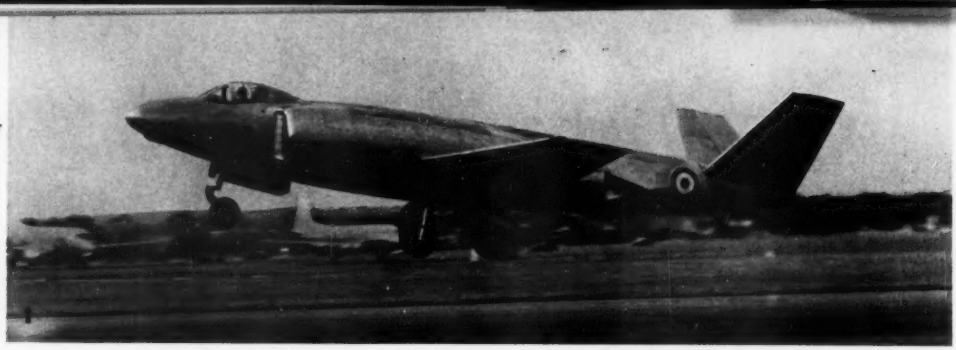
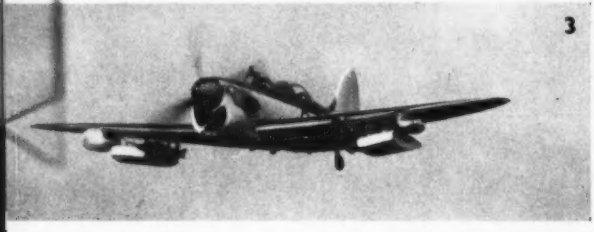
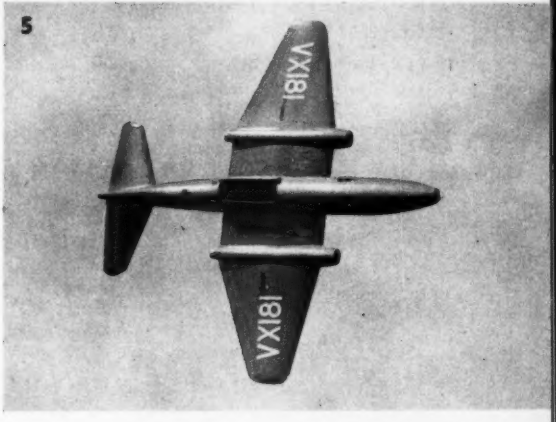
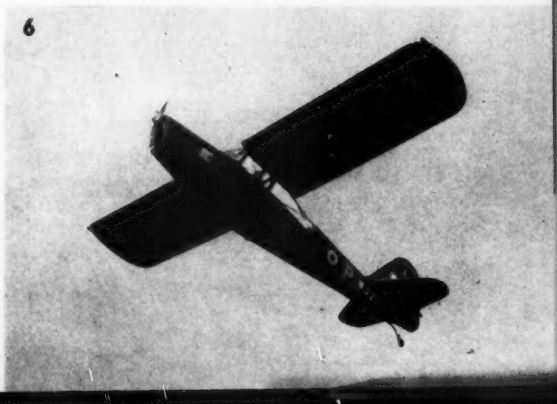


IN ACTION AND REPOSE...

(1) *Vickers-Supermarine 508 (two R.-R. Avons) taking off.*
(2) *The 508 landing. (Note action of leading edge.)*
(3) *Fairey Firefly 7, with sonobuoy containers and R.P.s.*
(4) *Auster B.4 ambulance/freighter (Cirrus Bombardier).*
(5) *English Electric Canberra P.R.3. (Note bomb bay and camera hatches.)*
(6) *Auster Model "S" A.O.P. (Cirrus Bombardier).*







The "Provost" has successfully completed tropicalisation trials

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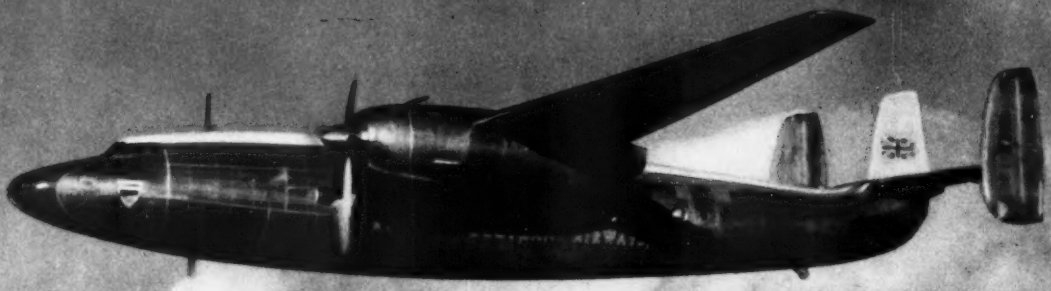
ALVIS LIMITED, COVENTRY, ENGLAND

The design of the Airspeed Ambassador combines the practical features and performance which fit it for service on the world's medium-stage routes—payload/range flexibility, a usefully high speed, economy at all cruising altitudes and passenger appeal



AMBASSADOR

BRITISH EUROPEAN AIRWAYS' [illegible] CLASS AIRLINER

THE AIRSPEED DIVISION OF THE DE HAVILLAND AIRCRAFT COMPANY LIMITED

THE MINISTRIES at FARNBOROUGH

Exhibits by M.o.S. and M.C.A.: Working Demonstrations

AS usual, two of the three Government departments principally concerned with aviation had stands in the "static" section of the S.B.A.C. Exhibition. Naturally, perhaps, in view of the enormous scope of their activity, the Ministry of Supply had a far more "cluttered" stand than did the Ministry of Civil Aviation, but what it lacked in variety of scientific and technical interest the M.C.A. stand made up for in attractive display.

Dominating the M.o.S. stand was an experimental bi-fuel rocket designed and constructed as a general purpose test vehicle for supersonic flight. During the initial stages of the trajectory the missile is accelerated by a boosting arrangement, which separates from the vehicle at an appropriate airspeed, the main bi-fuel rocket motor then taking over. For test purposes a telemetering set is installed in the missile to transmit the performance characteristics to a ground receiving station.

Another rocket exhibit illustrated transonic research technique. The principle involved in the measurement of wing drag by the present technique is that of measuring the drag of both winged and wingless bodies and thus determining wing drag by difference. A vehicle carrying the test wings is boosted to its maximum speed by a solid fuel rocket, which then burns out and allows the vehicle to fly freely under the deceleration of its drag, and of gravity. The flight is observed with ciné theodolites sighted along the flank of the open-air firing range, and from them the trajectory is determined by triangulation. The flight is also observed by high-speed ciné cameras to give qualitative information on the behaviour of the vehicles. The velocity is measured by a reflection Doppler radio set sighted behind the launching platform, with such accuracy that it can be differentiated to give the deceleration of the missile.

The exhibit dealt in some detail with the application of this free flying model technique to the measurement of drag. Although it has been used primarily to obtain information at Mach numbers outside the range of present wind tunnels, the technique is not limited to this and experiments have been made at Mach numbers from 0.7 to 2.5.

With the present focus of interest both on delta aircraft and advances in structural methods, the exhibit of a typical delta wing made of plastics claimed great attention. The exhibit was made to test the plastics constructional technique. A considerable number of nuts and bolts have been used in the construction, but all are covered by a thin outer skin which was moulded with the wing, removed while bolting was carried out, then glued in position and polished.

The material as moulded is porous, but it can be made impervious to fuels by "slushing" with certain compounds, thus making integral fuel tanks a practical proposition. The dielectric properties of the material allow radio aerials to be housed inside the structure, and its heat and sound insulating properties are good.

To illustrate the difficulties attendant upon combustion in gas turbines at high altitudes, a demonstration was presented by the National Gas Turbine Establishment. It was not possible to demonstrate full-scale low-pressure combustion test facilities within the space of a single exhibition stand, but instead a series of simple demonstration experiments were devised to show the fundamental changes in the nature of the combustion process as the pressure is reduced. Two identical gas burners were seen in operation. One was burning under normal conditions at atmospheric pressure, the other under reduced pressure in a low-pressure chamber. The experiments illustrated the gradual falling off of the quality of the combustion with reduction in pressure until, eventually, at a low enough pressure, complete extinction occurred.

Gust research is still a matter for considerable work and the R.A.E. have developed a counting accelerometer to obtain data from which may be determined the severity of the structural loads imposed on an aircraft by gusts during flight. The accelerometer records the number of times each of a series of levels of acceleration in a given direction is exceeded during a flight.

An important feature of the accelerometer is its ability to avoid counting accelerations occurring at frequencies above about 10 cyc/sec, such as those excited by the engine, while continuing to record superimposed accelerations of lower frequency such as those caused by gusts. This feature was shown in a demonstration, in which the accelerometer was mounted on a high-speed vibration table; no counts were recorded at 30 cyc/sec, but superimposed low-frequency bumps were identified. A second model showed the method of counting and the arrangements to prevent overshoot of the pointer.

Research into the behaviour of airborne missiles requires the transmission to a ground recording station of specific information about a number of physical quantities in the missile. This information is obtained by means of transducers which convert the physical quantities into corresponding electrical quantities, which are then used to modulate a telemetering transmitter. The telemetering transducers shown were of two types, one inductive and the other resistive, and both types were used to modulate the sub-carrier frequency of a pulse modulated 465 mc/s telemetering transmitter.

One technique for the suppression of external aerials on aircraft, to preserve the aerodynamic smoothness essential for high-speed flight, is to excite the airframe by means of a coil placed near the wing root. The exhibit illustrated the arrangements made for energizing the wings and fuselage of aircraft for communications purposes in the 2-20 mc/s band, and demonstrated the remote control system for tuning and matching the circuits for any of twelve pre-selected operating frequencies.

The complete submersion of electrical and electronic components in synthetic resin matrixes is a relatively new development, and under the title "Potted" Circuits an exhibit on the stand showed the various stages—from basic materials to finished product—in the assembly of a four-valve unit containing 38 components. Such a unit is very small, rigid and impervious to moisture. Once embedded in resin the components are not recoverable, so that the assembly becomes a "throw-away" unit, and has therefore to be made simply and cheaply.

A variety of components for general electronic equipment shown by the Telecommunications Research Establishment included examples of transformers, potentiometers, capacitors, resistors and switches displayed in a comparative form. The use of new components and methods, and the replacement of valves by new devices such as magnetic amplifiers, was also demonstrated.

The M.C.A. Exhibit

The main feature of the Ministry of Civil Aviation exhibit was a 14ft by 8ft model, built to a scale of 1:1,250, of London Airport as it will appear in the future.

Two runways, No. 1 for the take-off and No. 5 for landing, together with the taxiways to and from the central terminal buildings, were lighted. The line-and-bar approach lighting, both high and low intensity, and runway stop bars were also illuminated in their appropriate colours. Model aircraft of different types were shown at their operational or servicing points; one about to land, one taking off, and others on the ground were illuminated.

The future central terminal and other main buildings were shown in coloured relief and to scale.

The various lights were shown in three phases, viz. :—

(i) Under good visibility at night;
(ii) Under bad visibility at night;
(iii) Future buildings in addition to the lighting under (ii).

The model was flanked on its four sides by photographic and diagrammatic information on many aspects of London Airport activity. Subjects dealt with included present amenities, British aircraft, radio and radar aids, air traffic control, lighting, architectural design and statistics showing the increase in aircraft passenger and freight movements in the London area to date.

FORTHCOMING EVENTS

Sept.	22.	*Daily Express* South Coast Air Race, Shoreham.
Sept.	25.	Milan International Grand Prix.
Oct.	4.	R.Ae.S.: Seventh British Commonwealth and Empire Lecture, "Air Transport in New Zealand and the South Pacific," by A. V-M. Sir L. M. Isitt, K.B.E., R.N.Z.A.F.
Oct.	21-28.	Aero Club of Algeria: Tour of Algeria.
Oct.	24.	R.Ae.C.: Jubilee Ball.
Oct.	30.	Society of Instrument Technology: "Materials for Instrument Manufacture," by E. B. Moss.
Nov.	24.	Society of Licensed Aircraft Engineers: Main Lecture: "Functioning of a Manufacturer's Servicing School," by D. W. Richardson, M.B.E., A.F.R.Ae.S.
Nov.	27.	Society of Instrument Technology: "Visual Presentation," by K. F. H. Murrell, M.A., F.R.P.S.
Dec.	21.	Institute of Navigation: "Meteorology and Navigation," by Lt. Cdr. P. G. Satow, D.S.C., R.N.

SEVENTY NATIONS at DINNER

S.B.A.C. Entertains a Record Number of Guests: A Brilliant Occasion in London

THE Society of British Aircraft Constructors' annual dinner, held at the Dorchester Hotel, London, on Tuesday, September 11th, was a truly remarkable occasion. Every inch of the main ballroom was packed with guests, among whom were the representatives of more than seventy nations. There were those who had already seen something of the 12th Farnborough Display and Exhibition during the technicians' special preview that day, but the majority were invited for the official opening on Wednesday and the days which followed.

In the course of the three toasts, two welcome, if rather unexpected, lines were taken (whether by accident or design we do not know) by each speaker in turn. The first, in spite of the industry's preoccupation with military contracts, was that more effort and time should be devoted to civil transport. The second, of a quite different nature (though, in a sense, closely related) was concerned with the greater recognition of the strength of the Dominions and Empire in collaboration with this country. Viscount Bruce of Melbourne, had much to say on this theme.

Not for a very long time have we heard so much said of the Empire, which some people would have us believe is fast becoming a matter of history. To British ears it was most welcome and encouraging talk, and inevitably the name of Mr. Churchill was brought in. Some visitors may have wondered as to the appropriateness of the subject for an occasion which, in the past, has produced speeches of a more direct aeronautical flavour. However, Mr. Gill, the Society's president, proposing the guests, spoke of the aircraft industry's achievements and aspirations, and Sir Miles Thomas (in his capacity as president of I.A.T.A. as well as chairman of B.O.A.C.), of I.A.T.A.'s responsibilities and of B.O.A.C.'s plans. Summaries of their speeches follow.

Mr. Gill said that the number of guests at the 12th Display and Exhibition beat all previous records and the long and distinguished guest list was proof of the link which the air provided between countries. He felt he could claim that the S.B.A.C. Show was almost a measure of progress in aviation affairs year by year. He welcomed, in particular, delegates from the Anglo-American and I.A.T.A. Conferences. Thanks were specially due to Mr. Strauss for the help which the aircraft industry had received from his Ministry, and to Air Marshal Sir John Boothman for his unswerving support. Unfortunately, both Lord Ogmore and Lord Pakenham were unable to be present, but Mr. Gill would like to have told Lord Pakenham of the pride felt in the record of carrier-borne aircraft operating over Korea. Mr. Gill recalled that the Battle of Britain anniversary coincided with the public display at Farnborough, and he gave thanks to the R.A.F. for its plans for participation on that occasion.

Mr. Gill said that, while recognizing its priorities and responsibilities to the Services and N.A.T.O., the industry would not overlook its existing customers. It was vital to continue to press the claims of our wares. There were sufficient resources in the free world to look after both the needs of defence and of peace. Regarding the turbine transports which were shortly to go into operation with our Corporations we felt that what was good for our operators would be good for others, too. In conclusion, Mr. Gill spoke of the significance of the Woomera missile range in Australia.

The first response came from the Right Hon. Viscount Bruce of Melbourne, who welcomed the opportunity to speak to the leaders of the aircraft industry, whose responsibilities and obligations were, he felt, impossible to exaggerate. The world needed peace, economic progress and human betterment, and to all these aviation could make an outstanding contribution. Considering the lessons of the past in relation to the future peace of the world, Lord Bruce thought the words of Clauzewitz to be outstanding—"You must be strong but, above all, at the decisive point." Through the centuries the sea had protected us and, even more, the United States. As a result, we had been immune from attack, although in the last war Britain had had a foretaste of things to come. Behind this immunity we had been able to build up our armed forces and to concentrate them at the decisive point at the decisive moment.

He recalled that Mr. Gill had acknowledged, on behalf of the industry, the necessity of priority for rearmament, but had indicated his doubts as to the pattern devised by those in higher places. Lord Bruce said that he also had some doubts whether our thinking on the rearmament programme was as sound as it should be. It seemed to him that we were concentrating too much on the defensive and offensive preparations of our respective air forces, to the neglect of air transport. Just as in the past the Merchant Navy had been the essential adjunct to the Royal Navy, so he believed air transport would in the future play a similar rôle in relation to the R.A.F. For this reason he believed that in our rearmament we should be devoting more money, materials and brains to civil aviation and air transport.

Referring again to Britain and the Empire, Lord Bruce said it was essential that all the British countries should act together. Already much progress had been made in the aviation field in Canada and in Australia. In the past we had missed many opportunities of co-operation that would have been invaluable to Britain and to the Dominions concerned, and he instanced iron and steel and the motor industry. Let us not make the same mistake in this new and even wider field, said Lord Bruce.

Co-operation had been achieved in the development of guided missiles, and progress was being made in the co-operation of Britain and the Dominions over air transport. Lord Bruce trusted that there would be co-operation in the even wider field of all the free nations, but here it was essential that Britain should maintain her individuality. He said, "I gather that the British designer is tackling the problem of high-speed, high-level flight on lines which differ fundamentally from those adopted by our friends across the Atlantic. I also gather from the results so far achieved that there is no indication that British design is suffering in consequence. Let me urge upon the technicians of this Society that they retain their initiative and independence of thought and do not allow themselves to be overawed by the more advanced technical equipment and the weight of technical effort in the United States." In conclusion, he said that only on the foundation of a stable industry could the contribution of designers, technicians and craftsmen be brought to due fruition.

A second response was made by Sir Miles Thomas, who referred to the dependency of civil developments upon the military machine, and said that a measure of this was the ability of certain military aircraft to achieve a vertical speed greater than the horizontal speed to which many people have been accustomed. He was glad to hear of the recommendations to give more concentration to civil aircraft.

Regretting the absence of Sir Frank Spriggs, Sir Miles recalled his remark that the British lion was going to be jet-propelled. He (Sir Miles) would have added that the lion would be "both civil and military." Within the next few years B.O.A.C. would be operating two all-British round-the-world routes, one encircling the northern hemisphere, the other south of the equator, through Australasia. This vision was given reality by the technical skill of British engineers in producing the pure-jet and the turboprop engines to power the Comet and the Bristol 175 respectively.

It was planned to cater not only for first-class express services, but to bring the benefits of world-wide air travel within the reach of a still larger section of the community by introducing tourist rates, said Sir Miles. The Comet, by its demonstrated flying times of London-Johannesburg in 15½ hr and from London-Karachi in 11 hr, was making the world shrink to half its present size. It was an inspiring thought that no place on earth was now more than 30 hr away from anywhere else.

Sir Miles received support on every side when, obviously speaking outside his prepared speech, he said there was need for a reduction in the pettifogging restrictions and nonsensical form-filling at airports. They were out of all proportion to the speed of air travel. He added that 100 miles might be covered in the air in the time it took to fill in the forms on arrival.

B.O.A.C.'s chief went on to say that, grateful as we were for the assistance of our American manufacturer friends, given both in peace and war, British civil aviation was making a determined effort to fly on its own wings, both technically and financially, and in so doing we should link this good old British Empire of ours by still firmer bonds and trade sentiment and strategic security. The exciting round-the-world route pattern could not begin operation until the aircraft were delivered and the necessary ground facilities and the like had been brought into being. This pattern was a clear target and B.O.A.C. were energetically and effectively working with the British manufacturers concerned and with various airline associates towards this achievement.

The date of introduction would clearly be affected by a number of factors over which we had no direct control, such as the pressure of rearmament. It was up to the British manufacturers to live up to their promises and B.O.A.C. would girdle the earth around with the good old Union Jack in healthy and clean competition with the international airline operators. Paraphrasing a famous quotation, he added, "Give us the tools and we'll get on with the job."

CORRESPONDENCE

The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns; the names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

Electric De-icing

WITH reference to the article, "The Icing Problem," by S. S. Schaetzel, in your issue of August 31st, one statement is open to criticism. Speaking of the advantages of the electrical system, the author cites its "ability to deal with any icing condition, no matter how severe." He continued, "It is immaterial to the system how much ice is accumulated on the heating pads; the same small quantity of ice had only to be melted, from underneath, to ensure the breakaway of the deposit."

This implies that any "cycling" electrical de-icing system will function satisfactorily whatever may be the applied intensity of icing. This is not so. The time taken to raise the temperature of the inner ice surface from "switch on" of the system is dependent upon the thickness of the layer of ice—which increases, often substantially, the thermal capacity of the aircraft skin. Conditions are aggravated by the fact that, once the temperature of the ice surface is raised above ambient, the electrical system has to "make good" the heat lost to the air. This latter quantity is dependent on the position and structure of the surface protected.

It follows, then, that the temperature-rise of the innermost ice film obeys a logarithmic law and it is quite possible for the "on" period of the de-icing system to be of insufficient duration for satisfactory operation. Also, of course, the density of heating may prove to be inadequate for low ambient temperatures. Thus it is necessary to design an electrical thermal de-icing system for each specific installation, and no overall formula as to cycling time or power density can be laid down.

The above details are no doubt well known to your contributor but I have thought to emphasize them so that your readers would not gain the impression that *any* electrical system of thermal de-icing is bound to prove satisfactory in service.

St. Albans, Herts. P. C. HODGE.

Unhappy Designations

WITH regard to the squadron identification letters "US", it is possible that your correspondents of August 3rd and 17th are both correct. Indeed, I can visualise that those unfortunate letters were offered to, and cold-shouldered by, a number of squadron commanders.

I can certainly vouch for the fact that, at some time in 1940, they were painted on the Hawker Audax army co-operation aircraft of No. 28 Squadron, then stationed at Kohat, N.W.F.P., India, alongside the Westland Wapitis of the one-and-only No. 27 ("pregnant elephant") squadron. Let me hurriedly repeat, that this *was* in 1940, not 1914; India was like that!

As I remember the story, some pretty caustic correspondence must have passed between the Air Ministry and the house-proud squadron-commander. At any rate, a few weeks later, red-faced mechanics were painting out "US" and substituting "BF", so the poor chap got the worst of it in the end.

Incidentally, it seems a pity that such squadrons as No. 27, with a wonderful record in the 1914-1918 war, and an active-service record between the wars, should be reduced to ferrying soldiers and whatnot around the earth. Tradition dies easy that way.

Nairobi, East Africa. F. FENTON, F/O.

Facing Which Way?

IN the currently fashionable argument on backward- or forward-facing seats many people espouse one form or the other without considering the argument sufficiently deeply.

It seems to me that the case in which we are interested is that of the aircraft which hits the ground and/or an obstacle whilst in a normal horizontal position when taking off, in flight or landing; the arrangement of seats to face forward or backwards is nullified if the aircraft strikes while falling vertically, groundlooping or somersaulting. If it disintegrates, the argument again has no force, since the arrangement of the seats and their occupants relative to the force imposed by a head-on collision is immediately and radically changed. We are therefore left with the case in which the aircraft does not disintegrate, but may or may not be damaged. In either case the important point is whether or not the seats break loose. If they do, they and their contents will normally pile up in the forepart of the fuselage; and fatalities are then likely to occur, regardless of the position of the seats before they begin to move. I would be glad if anyone could produce evidence on this point, as distinct from opinions. My own view is based on observation of the results of accidents to aircraft with forward-facing seats; so far I have seen nothing to suggest that backward-facing seats would give better results.

If, however, the seats do not come away from the floor, and there is no damage to the fuselage, the fate of passengers facing forward would seem to depend largely on whether or not they are strapped in. Now passenger harness does not include shoulder straps, and what we need before deciding on the way seats should face is evidence to show what sort of injuries are suffered by people who are thrown forward when held only by lap straps. My guess is that there is a strong argument here for backward-facing seats without waiting to see what happens in the next crash where such seats are being used. In the case of an undamaged fuselage where the passengers are not strapped in, forward-facing seats provide no safeguard at all. *Prima facie*, backward-facing seats would seem here to give some protection.

Structural damage to the fuselage in the conditions postulated usually involves complete destruction of the whole width for a varying distance along the length; splitting of the fuselage along its length like a pea-pod; or damage to one side only. In the latter two cases one cannot forecast what the results are likely to be and there is, therefore, no argument for or against either side. However, in all three cases the argument with regard to harness is still valid; and there seems again to be a strong *prima facie* argument for backward-facing seats since any of them out of the actual zone of destruction will provide protection to the occupant. If destruction is complete the position of the seats is irrelevant.

What we really want, it seems, is seats which will not move relative to the floor in any conditions short of complete destruction. It is only when this has been achieved that it becomes important to decide firmly which way seats are to face. Even so, there is still a snag; B.E.A. have recently said that they are considering economic and engineering evidence on rear-facing seats. If the engineering problem is as simple as I think it is (perhaps wrongly?) the economic problem seems to have several important aspects. First there is the question whether immovable seats must be permanent or not in the way that fins and wing stubs are permanent; this is clearly of importance where aircraft are required to be interchangeable in the passenger and freight rôles or of variable seating-arrangement. Secondly, any operator who installs rear-facing seats is clearly assuming that his aircraft may crash. We all know that some will, but no operator wishes it to be assumed by the unthinking public that he is the only one who needs to take this particular precaution. Advocacy of forward- or rear-facing seats on the basis of vaguely generalized humanitarian feelings, and in the absence of evidential facts and figures, is over simplifying a complex situation and is in any case slightly premature. I suggest that one of the Corporations should fit rear-facing "immovable" seats (since we know what happens with forward-facing seats) and see what happens. The effect of sales may be disastrous, though I think not; in any case it would seem to be a legitimate function of a nationalized concern (whose criterion is not solely the commercial one) to take the risk. The more important question of the value of such seats in a crash will no doubt be demonstrated in due course whether we like it or not, although I should have thought that theoretical considerations alone would have justified their use from the point of view of safety, if not of economics.

Oxford. B. J. L. HAIMES.

Test-flight Evidence

SINCE the war ended in 1945, British test-pilots have been sacrificing their lives at the rate of five each year. Until such time that the widespread testing of aircraft is by remote control, it is inevitable that lives will continue to be spent in the quest for aeronautical knowledge.

No effort should be spared, therefore, in making sound-recordings of the test-pilot's voice throughout a flight, and in filming both the instrument panels within the machine, and (from a distant part of the structure) the aircraft itself.

Tightly packed as the modern research aircraft is, such recording gear should always be included in the basic equipment; no aerodynamicist will begrudge a small blister housing a camera within a wing or fin when information gained therefrom can enable aviation to be made safer. On occasion, lives must be spent. Let us not allow them to be wasted.

Reading, Berks. DAVID R. MACFARLANE.

[We believe that voice-recording equipment was installed in at least one prototype lost during the past year, but that it was not in use at the crucial moment.—ED.].

MASS AIR TRAVEL?

A Main Topic of Discussion at the I.A.T.A. Conference in London

TO express the opinion that "air transport is now here to stay" lays one open to the accusation of stating the obvious. But the question of whether or not it is here to stay *in its present form* is one which some 160 representatives of the world's leading airlines were earnestly discussing at I.A.T.A.'s annual general meeting in London last week. Following the opening of the assembly by the Prime Minister on Monday, September 10th (already reported in these pages), the delegates heard during the week the reports of the Association's financial, legal, technical, medical and traffic committees. The results of their deliberations will give a general indication of the lines along which future resolutions will be made on these topics by the individual committees.

Last week's I.A.T.A. session is of special importance in that it came at a time when the world's air transport system is about to feel the impact of several revolutionary developments. In the first place, having experienced such a phenomenal growth in its short span of existence, and consequently having proved itself such a powerful influence on civilization itself, air transport has now reached the stage at which a decision must be made on the actual extent to which the market can be beneficially widened. Hitherto, it has remained largely a medium of travel which only the relatively rich could enjoy. However, as Sir Miles Thomas pointed out in his first address as president of I.A.T.A., it is in fact a social responsibility of the air travel industry that its services should be available not only to the favoured few, but "to every citizen in the world." Certainly, the idea of making air travel available to the masses is one of the things which is now foremost in the minds of all airline planners, and during last week's conference it was seen that much of the discussion revolved around these possibilities.

In the second place, technical progress during the past 40 years has steadily brought about an increase in cruising speeds—now largely enhanced as a result of development of the gas-turbine power unit—a factor which, although carrying with it a number of difficulties yet to be solved, stands out as the second major influence in the changing character of air transport.

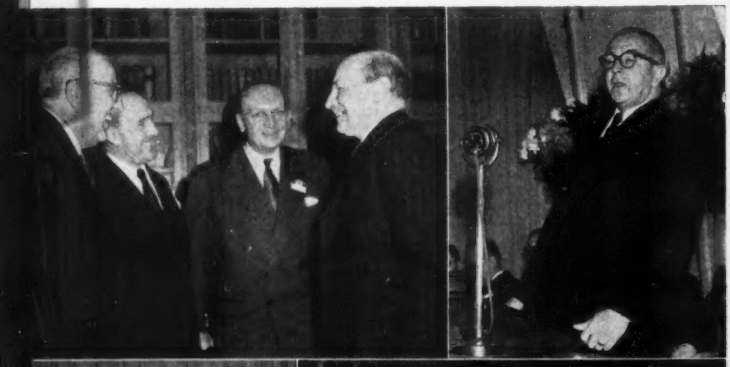
The realization that there now exists a market in which, potentially at least, air travel can be made available to the world's middle-income groups has naturally been suggested by traffic results achieved to date. Some indication of these figures, and of the mass travel plans which are now being investigated by the world's airlines, were contained in the annual report presented by I.A.T.A.'s director-general, Sir William Hildred, before last week's assembly. Sir William's main points may be summarized as follows.

Of the statistical results he said that "1950 was a wonderful year in the matter of traffic volume," and that "many airlines are reporting with amazement the spectacular results of the first half of 1951." The 30,000,000 passengers carried by the airlines in 1950 represented a 15 per cent increase over the number carried the year before: they travelled a total of 26,000,000,000 passenger kilometres. The average stage-length equalled the distance between Paris and Prague, or Montreal and Detroit. The total of cargo ton-kilometres for 1950 showed an even more remarkable increase of 33 per cent over the 1949 figure; the total was 750,000,000. It was estimated that if a single passenger and one ton of cargo had done the travelling represented by these cumulative figures, the passenger would have spent 60 years circling the globe 660,000 times at the equator, while the unit of cargo would have made the flight 20,000 times. In all, the airlines provided 210,000,000 ton-kilometres of mail transport during 1950, a 12 per cent increase over the 1949 total. The number of aircraft in the airline fleets remained at about 2,500, but their higher speeds and larger payloads now provided 40 per cent more passenger and cargo capacity than existed four years ago. The major re-equipment programmes of many companies during the next year should increase these figures substantially. Annual gross revenues of the airlines during 1950 amounted to approximately $1,500,000,000. Approximately 200,000 people, of whom 10 per cent were aircrew, were now employed by the airlines.

Sir William Hildred went on to say that a fact which should cheer the airlines on to an even better record was that the preliminary statistics for 1950 indicated that the safety record would show still further improvement.

Reviewing the accomplishments of the airlines during the five years of I.A.T.A.'s post-war activity Sir William pointed out that the Association's traffic conferences had created a world-wide pattern of rates and fares which have already achieved wide flexibility in promotional rates, short of the two-fare system. At the same time, he said, fare increases had been kept far behind the rising costs of other commodities and services, and some actual reductions had been effected. The American factory worker would formerly have had to work 540 hours to earn a transatlantic airline ticket, but the excursion fare over the North Atlantic this year represented only 260 hours of work for him. "Although this is not good enough to promote a mass vacation exchange of workers between the industrial plants of Europe and America we are getting closer to it," added Sir William.

He continued: "We have been able to absorb during the last four years the largest



At Westminster: Enjoying a jest with the Prime Minister are (left to right) Roushdy Bey (Misrair), M. Briend (Air France) and M. Périer (Sabena); before the microphone is Sir William Hildred. Below: Per A. Norlin. (S.A.S.) and Mr. Hudson Fysh (Qantas) listen to a speech; and Mr. John Watkins (T.A.A.) discusses Australian affairs with Sir Keith Smith (B.C.P.A.).

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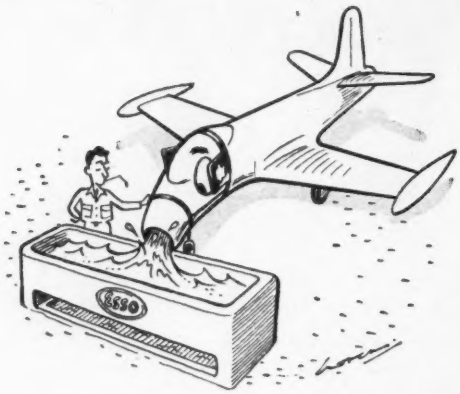
Pumpability

THERE'S an old saying about taking a horse to the water and not being able to make it drink. Whether it's true or not I couldn't say ; there are times, though, when horses under the bonnet of my old bus won't touch a drop of petrol even when the tank is full to the brim.



Normally, I gather, modern gas-turbine engines are pretty thirsty by any standard. Their rate of intake may be as high as 1,000 gallons an hour (neat !), though the stuff must be exactly right for them. No foreign bodies or anything.

They like their fuel clean, so the aircraft designers have to provide good filters between the tank and the engine. The filters take care of any impurities that may (and do) find their way into an aircraft's tanks.

The filters also take care of any ice crystals that may form in the fuel. All petroleum fuels absorb a small amount of water, and this may freeze out at something or other Fahrenheit or Centigrade. The filters, by the way, must be fine enough to trap even the smallest crystals and large enough (in area) to avoid being blocked by them.

Reduce the temperature sufficiently and the petroleum fuel itself will freeze—*any* petroleum fuel. Solid material forms in the tank and moves along the feed-pipes. . . . Another job for the filters.

Now the fuel supplier cannot wholly eliminate this trouble or even reduce the amount of ice formed : here he is up against what are sometimes known as the immutable forces of Nature. But by a skilful choice of fuel components he *can* ensure that the mixture will not freeze except at temperatures well below those at which the aircraft operates.

One more possible snag : if a fuel is too volatile it will form vapour in the pipelines, and this will impede the flow of juice and perhaps stop the engine. This er—contretemps (shall we say ?) can only be avoided by selecting the right fuel for the job, fuel concocted by men who work cheek by jowl and tête-à-tête with the aircraft designers and the aero engine manufacturers.

Yes, this non-stop day-by-day liaison between the aircraft industry and the fuel technologists of the ESSO organisation is still another good reason why

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MASS AIR TRAVEL . . .

part of the steady increase in the cost of the fuel, the services and the commodities which airlines must buy. It is just, I think, to say that in terms of the other things the worker buys with his money, a dollar or a pound will get him a good deal more air transport today. I do not know of any industry which can show a greater improvement in efficiency." Noting that re-armament efforts during the past year had resulted in scarcities of spare parts for the airlines, Sir William expressed the opinion that production policies which sacrificed transport facilities to military aviation demands were "short-sighted."

In the financial field, Sir William said that substantial economies had been achieved by standardizing interline accounting, and the I.A.T.A. Financial Committee was now exploring the uses of "penny elimination," a system of rounding off tariffs and accounts to the nearest dollar or pound. Among other legal points, he said that airline views had been substantially incorporated in the latest draft of the Rome Convention on liability of carriers to third parties on the ground, and expressed the hope that governments would be able to sign this convention during the next year.

Looking back over I.A.T.A.'s technical co-operation with I.C.A.O., he said that "every airline in the world and every one of its customers owed a great deal to I.C.A.O. and to the leadership of its president, Dr. Edward Warner. Its accomplishment in five or six years had been tremendous and was of the utmost significance in every phase of airline operations. By turning out 12 technical annexes to the Chicago Convention, covering virtually every aspect of government regulation of aviation operations, I.C.A.O. had actually produced valid international agreements "covering thousands of points and ultimately determining the actions of more than 50 governments," at the rate of one every five months. If I.C.A.O. had not acted to co-ordinate the efforts of governments, he continued, traffic would have been restricted by the sheer inadequacy of installations and facilities.

Rates and Fares

A major accomplishment of the I.A.T.A. Traffic Conferences during the past year, Sir William said, had been the filling in of the last gaps in a world-wide structure of rates and fares by bringing North, Central and South American international routes into the pattern. During the past five years the Conferences had brought about a "massive facilitation of long-distance travel."

On this matter of rates and fares, Sir William said that the I.A.T.A. Conferences had experimented rather boldly in the absence of any precedents for the world-wide pattern which existed today. "I think that we can be proud that, of the thousands of rates worked out by the Conferences, only a few score have ever been disapproved by governments for any reason whatsoever," he added.

The speaker continued: "People who want to have cheaper transport, and who feel that if there had been no I.A.T.A. Traffic Conferences they would have had low rates much sooner, are both right and wrong: right in the short term, but dreadfully wrong in the long. Rates would have been disastrously low for a year or two of cut-throat competition; but eventually the customer would have been at the mercy of the sabre-toothed survivor, who would then charge to please himself and who would not be particularly anxious to please the customer." I.A.T.A., he said, had succeeded in maintaining a reasonably economic basis of operation without sacrificing the essential individuality of the operator and without curtailing in any way the beneficial effects of competition.

Sir William emphasized that while relationships between the airlines and the Universal Postal Union were close and cordial, the airlines had to realize that the U.P.U. was making "a very determined drive" to reduce the rate of payment for the carriage of foreign air mail. Rates would come under review next year at the U.P.U. Congress at Brussels, at which the airlines hoped to present "unanswerable arguments to resist the downward trend." The Director-General thought also that the role of air mail to international air transport had declined in relation to other kinds of payload. Where once it had provided the impetus and main support of international services, for the last four years it had constituted a stationary 6 per cent of the total revenues. "Mail revenue," he said, "now provides only the icing on the cake, and we should be hungry indeed with only the icing to live on."

Facilitation of air transport by eliminating customs, immigration and other red tape at international airports was reported to have progressed during the past year on the basis of the standards developed by I.C.A.O., but more co-operation from the airlines themselves and on the part of certain governments in some parts of the world was still necessary. Major facilitation problems still existed, for example, in South America, although it was hoped that an I.C.A.O. meeting on the subject at Buenos Aires in November would give additional force and effectiveness to the campaign there.

Sir William hoped also that airlines serving Canada and the United States would press for a revision of the archaic requirement that the airline should assume full responsibility for any traveller who it was found necessary, for any reasons at all, to turn away. "It seems a bit thick," he said, "for an airline to have to pay the bill for a passenger's return if the U.S. Government decides that its consuls somewhere in Europe had no right to issue him such a visa."

The airport administrations at Amsterdam, Copenhagen, London, Paris and Zurich were praised by the Director-General for having installed direct transit areas, in which international passengers on the ground awaiting aircraft could remain and enjoy the essential amenities without going through the usual formalities.

In his economic review of airline development during the year, Sir William said that airlines should not be concerned about competition from other forms of transport. He pointed out that airline passenger traffic had increased 17 times, and cargo traffic 50 times, since the immediate pre-war years, while surface transport loads were still only barely exceeding their 1937-38 levels.

Sir William warned that although most airlines, during the past year, had been able to achieve some profits or to reduce their deficits substantially, the increased volume of traffic should not be considered as an assurance of profits.

There existed at present a serious trend of rising costs. Landing fees, in particular, had been increasing, Sir William said, at rates which could in no way be related to the additional costs of operating airports and the various navigational facilities. They seemed to be based rather on the desire of many authorities, working without co-ordination or prior consultation, to exact a ransom from the airlines where these could not help themselves. The position had now been reached, he thought, where airlines would wonder whether it was worth while to stop at an intermediate point and incur the heavy landing charges, rather than fly right through and sacrifice valuable payload. Average increases of about 30 per cent in wages and salaries had been reported by most airlines, and there was no sign of any downward trend in labour costs.

Keeping Down Costs

On airline efficiency, Sir William pointed out that the airlines had so far managed to keep the rate of increase in costs per ton-mile to a level well below that of the increase in operating cost as such. Some I.A.T.A. members, even in the difficult months of 1950, had actually managed to reduce their costs per ton-mile; others had registered increases, but in no cases had these risen faster than the overall operating costs.

A stage had now been reached where no further improvement in operating efficiency could be great enough to overcome the further pressure of rising costs. The airlines would do their utmost to keep costs down to the routine of scheduled operations, and when heavy development costs had been written off, operating costs might possibly remain stationary even if prices continued to rise. But this was becoming increasingly hard to achieve.

Increased efficiency, plus the "incredibly buoyant" airline revenues which were a feature of the current year, had contributed to make the overall financial position of the airlines much better than it had been in the past. This increase in revenues had been affected only slightly by increases in fares, which were more than justified by rising costs, and in any case had been offset by an improvement in the quality of the transport offered to the public. "A pound of steak in 1951 is not very different from a pound of steak in 1941," Sir William declared, "but an airline journey now is a very different proposition from the weather-permitting, backaching, hedge-hopping, twin-engined, 130 m.p.h. flight of the early forties."

Discussing the possibilities of lower fares, the Director-General said that the success of the various cheap fare plans to date had finally borne out the contention which was made immediately after the war, that the airlines' future lay in going all out for the mass market at which—thus far—they had only "nibbled." Nothing short of a complete, all-year-round, regular two-fare system could take full advantage of the desire of the average man in every country to travel far and wide on his vacation. The outstanding success of coach travel in the United States was cited as a good example of this system. "The rich market of mass travel is still before us," he said. "It consists of thousands of people who would not travel nowadays by any form of surface transport. We have done our best to make travel attractive. It is now high time to concentrate on making it accessible to everybody who wishes to make use of it."

He thought that the world-wide introduction of tourist services would do a lot towards clearing up some of the complexities in the present rate structure.

The introduction of cheap travel would also clean up the

(*Concluded on page 405*)

CIVIL AVIATION

B.O.A.C. ROUTE PLANS

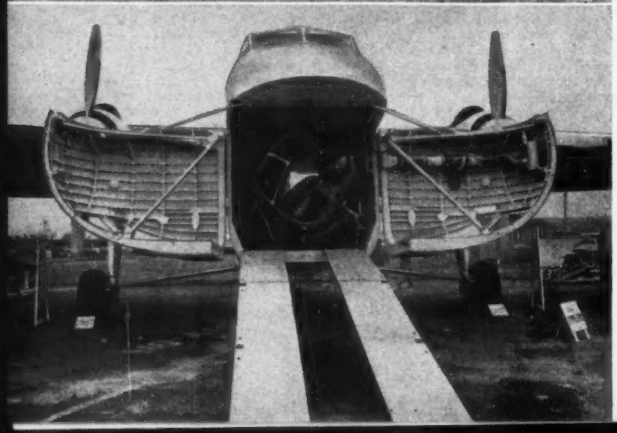
IN a recent speech before the Society of British Aircraft Constructors, the chairman of B.O.A.C., Sir Miles Thomas, gave some indication of B.O.A.C.'s future plans in the matter of route extensions during the next few years. The Corporation is planning a route pattern which will provide two all-British round-the-world routes, one in the northern hemisphere and the other running south of the Equator through Australasia. The northern route will embrace the North Atlantic, Canada and the North Pacific and join up with existing B.O.A.C. services to Tokyo. The other route will cross the Atlantic and the American Continent to the shores of the Pacific, thence, in conjunction with the Corporation's associates, B.C.P.A. and Q.E.A., linking Australia to the homeland by east and west-bound routes.

Sir Miles Thomas said that the date of introduction will be affected by a number of factors—such as the pressure of re-armament—over which B.O.A.C. have no control, and the new route pattern could obviously not begin until the Comet and Bristol 175s were delivered and the problem of providing necessary ground facilities had been solved. Nevertheless, the pattern is said to be "a clear target" and B.O.A.C. is energetically working towards its achievement.

LOCKHEED'S ALL-CARGO PROJECT

THE Lockheed Aircraft Corporation has announced a new all-cargo project which is, in effect, a suitably modified version of the L-1049 Super-Constellation. Designated the L-1049B, it will have a specially reinforced cabin structure, with extra sturdy fittings designed to withstand harsh treatment and massive loads. Intending to make the new Connie "a real money-maker," the manufacturers have designed it to have a direct operating cost of less than five cents per ton mile. The first of these new cargo conversions will probably be ready for delivery by 1953. It seems likely, also, that the type will have a military application, and orders are expected from the U.S. Navy and Air Force. Both commercial and military 1049Bs will have 3,250 h.p. Wright compounded piston engines, with provision for conversion to turbo-prop power at a later date. Maximum payload for the commercial version is to be between 40,000 and 43,000 lb, although it is expected that the average payload carried domestically within the United States will be around 38,600 lb and that the average transatlantic figure will be 36,300 lb. Cruising speeds range from 300 to 336 m.p.h. The main cargo compartment will be 84ft in length, and will have a total cargo volume of 5,568 cu ft. Other special features include twin loading doors measuring 6ft x 9ft aft and 6ft x 5ft forward; an optional electrically driven conveyor chain built into the floor to facilitate the handling of heavy cargoes; flooring constructed of magnesium which, although of light weight, is particularly durable; and watertight jointing to permit the hosing down of the extra thick plastic wall coverings and the all-metal floor.

In the L-1049B, Lockheed's seem to have evolved an aircraft which meets the long-desired specification for a high-speed, economical, large payload type for use on long-distance operations. A full-scale wooden mock-up has been prepared and the manufacturers are ready to go ahead with production immediately.



FASHIONS IN FREIGHTERS: These two styles of cargo-stowage were seen at Farnborough. Above is the new Auster B.4, which can be converted in a few minutes for use as an ambulance, a freighter or as a normal four-seat passenger machine. The rear loading doors are detachable. Just how useful is the capacious hold of the Bristol 170 Freighter can be judged from the lower photograph, in which it is seen to accommodate easily a dismantled 171 helicopter.

SCOTTISH SCHEDULES CHANGED

PRESIDING at a recent meeting of the Scottish Advisory Council on Civil Aviation, Sir Patrick Dollan announced a number of changes in the frequencies of Scottish services. He pointed out that when the new schedule for London routes comes into force on October 28th there will be one daily return service between Edinburgh and London, except on Sundays; this frequency may be augmented if Edinburgh traffic warrants it. On the London-Glasgow flights two aircraft would operate each way on weekdays and one each way on Sundays. Winter timetables for other Scottish routes will take effect from October 1st. Other points of interest among the new schedules include the fact that frequency between Glasgow, Benbecula and Stornaway is to be thrice weekly instead of daily, while the Prestwick-Errol-Aberdeen service may be withdrawn for the rest of the year. Commenting on the results of Scottish traffic during the past twelve months, Sir Patrick said that the Edinburgh Festival had boosted totals satisfactorily, but the go-slow dispute in July had cost about £50,000

OPERATIONS OFFICERS' PAY

THE M.C.A. has announced a number of salary increases for operations officers. They range from an additional £60 a year starting salary for Grade 3 officers (at age 26), to £175 a year added to the maximum pay of Grade 1 officers. The increases were awarded by the Civil Service arbitration tribunal and are retrospective to September 1st, 1950. The claim had been placed before the tribunal on behalf of 138 operations officers whose salary scales (which, incidentally, had been in force since January 1st, 1947) were previously: Grade 3, £500, age 26, rising by increments of £25 to £650; Grade 2, £700 to £900; and Grade 1, £950 to £1,100. On behalf of the personnel concerned, it was contended that the qualifications needed to become an operations officer were broadly comparable with those normally specified for other "professional" classes, a view which was apparently contested by the Ministry of Civil Aviation. Most of the operations officers are ex-aircrew and, in some cases, retired airline pilots of some considerable experience.

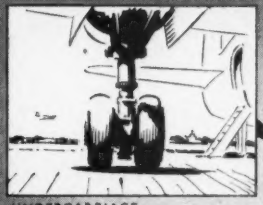
ANGLO-U.S. "AIR ALMANAC"

IT is officially announced that, as from 1953, the *Air Almanac* and the *American Air Almanac* will become a single publication, under the title of the *Air Almanac*. It will be produced jointly by H.M. Nautical Almanac Office of the Royal Greenwich Observatory, Hurstmonceux, and the Nautical Almanac Office of the U.S. Naval Observatory in Washington, to meet the general requirements of air navigation in the United Kingdom, the United States and Canada. The *Air Almanac* will be printed and published separately in England and the United States, but will otherwise be identical.

A number of changes have been necessary in both the former publications. None of these, it is stated, has any effect on the principles of tabulation or on the use of the *Almanac* for navigational purposes.

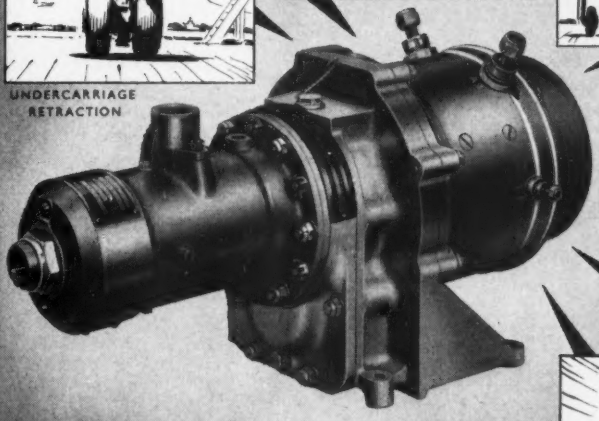
MESSIER

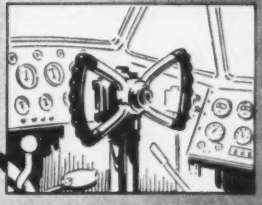
BOMB DOOR OPERATION



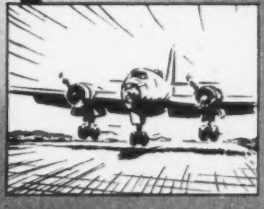
UNDERCARRIAGE RETRACTION

FLAP OPERATION



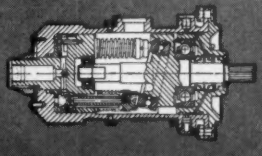


POWER FLYING CONTROL



BRAKES

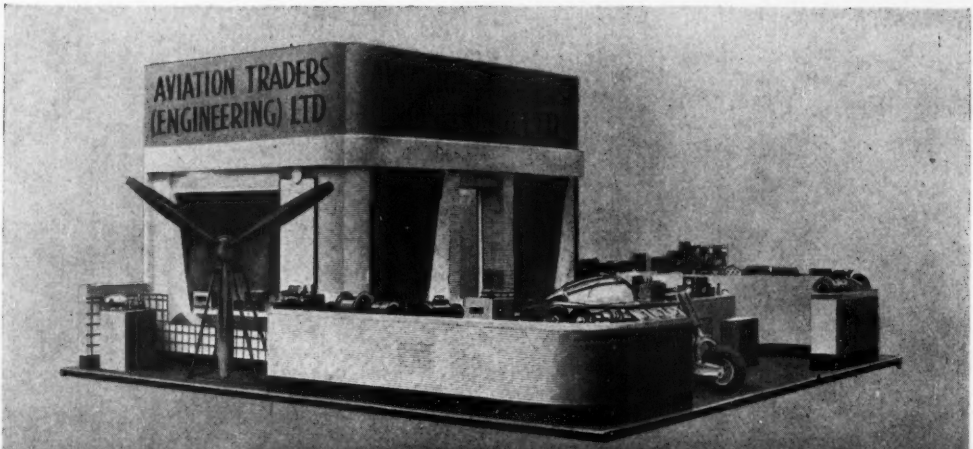
4000 lb. per sq. in. *System*



The heart of the Messier 4000 lb/sq. inch hydraulic system is a seven piston swash plate pump, engine driven or directly coupled to a high speed electric motor.

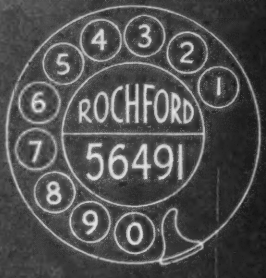
Electric drive offers many advantages in installation and functioning which offset the weight of the motor itself . . . .

BRITISH MESSIER LTD. GLOUCESTER



YOU DID NOT FIND THIS STAND AT FARNBOROUGH
BUT YOU WILL FIND US STANDING BY AT

SOUTHEND-ON-SEA



HEAD OFFICE

BOVINGDON

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CIVIL AVIATION . . .

MASS AIR TRAVEL (continued from page 403)

competitive picture. He believed that some of the airlines were pre-occupied with the share of the market taken by other companies, to the exclusion of the mass market which was within their reach. Sir William concluded: "The present game in which airlines vie with each other to give away more things than their competitors will be played on a different pitch when cheaper travel becomes available. On the one hand, it will encourage competition on the basis of honest, conscientious and efficient service. On the other, it will give the opportunity to every traveller to choose the type of service within his means and within his desire. The vast market which we have not yet even tapped makes it unnecessary for any airlines to try to take a passenger from a competitor. Too much time is now spent in inducing people to travel by line A instead of line B, but too little time is spent in inducing more people to travel."

Further discussions on tourist-fare possibilities also took place later in the week when the reports of the individual I.A.T.A. Committees were presented. For example, the report on the Traffic Conferences, submitted by Mr. R. E. S. Deichler, vice-president of American Airlines, dealt at some length with this subject. It was Mr. Deichler, incidentally, who presided over the last session of the Bermuda Conference in May at which it was recommended that a tourist rate should be operated across the Atlantic for an experimental period of six months. Although, during last week's meeting, the actual discussion on this proposal was private, Mr. Diechler said at a Press conference later that, if the North Atlantic operators agreed, this proposal would be submitted to a postal vote by other airlines. The tourist rate would be about two-thirds of the standard fare, which is at present $375, but is shortly to be increased to $395. Mr. Deichler thought that once the tourist rate was established for Atlantic services—and this would probably not be before October 1952—the idea would spread rapidly. Operators would then make their own findings on such matters as costs and revised seating arrangements.

The delegates eventually decided that representatives of the ten airlines which operate across the Atlantic should meet in London to try to reach an agreement on a definite tourist rate, and this meeting did, in fact, begin last Wednesday. The resolutions evolved at this conference will be a guide to similar fare reductions on other routes. Another item on the agenda of this same meeting was the controversial question of whether or not free airline tickets should be restricted; there was also discussion of the limitations which may be imposed on the provision of such amenities as drinks and luxury meals during flights.

At a Press conference held on the closing day of the I.A.T.A. session, Sir Miles Thomas expressed the opinion that tourist travel by air was definitely on the way. The problems of introducing it, however, would have to be worked out in strict relationship to the economic considerations involved. The amount of cabin space per passenger, and the number of seats in the aircraft had to be related to the amount of cubic air space available and the question of ventilation. These matters would affect not only the passengers but also the crew, whose physical condition and oxygen supply had also to be considered. The speaker emphasized that airlines could not just take an aircraft, put a lot of seats in it and then call it a high-density machine. The amount of time which would be required to convert equipment would also vary with different companies.

It should be remembered, said Sir Miles, that a tourist rate would not merely provide a cheap, cut-price or "austerity" means of travel. Tourist travel must be made attractive and saleable. He said it had been the feeling of the conference that tourist travel must attract a wide section of the public not only because of its lower price, but also because it could offer a comfortable and universally acceptable means of transport. There were stern economic limitations on the levels to which fares based on the present standards of amenity could be reduced. For this reason the introduction of a second-class rate, devoid of all extraneous luxuries, offered the most obvious means of cheapening and further popularizing air travel. He stressed, however, that it was only the amenities which were to be sacrificed and that safety standards could in no way be lowered. In airline operation safety and profitability were always pulling in opposite directions. Widespread adoption of austerity services would therefore emphasize the need for the most stringent vigilance to be exercised by the organizations presently responsible for maintaining the desired standards of safety. Discussing concrete proposals for a North Atlantic tourist fare, Sir Miles Thomas foresaw that the greatest economies would be achieved by flying this route in at least three sections.

The I.A.T.A. Annual General Meeting was terminated by a public session last Friday at which delegates were asked first of all to choose by ballot the venue for next year's meeting and, secondly, to appoint a new president-elect. Both Argentina and Switzerland had offered their hospitality for the next A.G.M. but the decision eventually rested with the former country in view of its easier accessibility for most of the European representatives. As is the usual custom, it was then proposed that the president of the national airline in whose country the meeting was to take place—in this case, Dr. W. Berchtold of Swissair—should be designated as the next president-elect of I.A.T.A. In voicing his acceptance of this honour, Dr. Berchtold said he had been very impressed by the amount of constructive work which had been achieved at this meeting. He hoped that his own country could contribute in some part to a similar success in 1952.

The assembly also passed two formal resolutions referring to the establishment of direct transit areas at international airports and heard a statement read by a representative of the Czech airline, C.S.A., deploring the fact that the U.S. authorities have cancelled permits for Czech aircraft to fly over Western Germany.

Next week we intend to publish a further report on some of the other aspects of the world's airline problems which were discussed by the delegates. It will include notes on the reports of I.A.T.A.'s Legal, Traffic, Financial and Technical Committees.

BREVITIES

THE M.C.A. announced last week that a bilateral air agreement between the United Kingdom and the republic of Panama was signed in Panama City on Saturday, Sept. 15th. It provides for the mutual grant of facilities in the two territories for the operation of scheduled air services. The agreement takes effect provisionally from the date of signature and is subject to ratification by both governments.

* * *

America's 15 domestic airlines all made a profit during the first six months of this year. These are the best results since 1945, when three companies showed deficits. The total net operating income, at £18 million, was nearly four times the figure for the corresponding period of last year.

* * *

Several companies are now examining the possibilities of a concession offered by the Portuguese Government under which a private corporation may operate regular services between Lisbon and Portuguese Africa, Oporto, Madrid, Paris and London. New routes would also be inaugurated from Lisbon to Rio de Janeiro and Madeira. One stipulation is that the company which accepts this offer must be registered in Portugal.

* * *

The first prototype of the Breguet 761 Deux Ponts freighter is now undergoing trials at Marignanne for the final part of its full C. of A. The three machines which have so far been built are all powered by Pratt and Whitney B.31 engines of 2,050 h.p.; they are certified for an all-up weight of 45 tons and will be delivered to private companies. The remainer of the series, Nos. 4-15, will have an authorized gross weight of 48-50 tons.

* * *

During the first six months of this year, Swissair enjoyed a substantial increase in traffic. A total of 121,052 passengers was carried and freight showed an increase of 82.3 per cent.

* * *

Trans-Canada Airlines have placed an order for five Super-Constellations, at a cost of $1,500,000 per aircraft. The company has also purchased three DC-4 North Star Skyliners and some spares from Canadian Pacific Air Lines for a total price of $2,000,000. The Super-Constellations, which are scheduled for delivery in 1953, will be put into service on T.C.A.'s overseas routes, while the additional North Stars will enter service early in 1952.

* * *

On his arrival at London Airport recently, Mr. Warren Lee Pierson, chairman of T.W.A., said that his company was considering the possibility of buying D.H. Comets. While in England Mr. Pierson intends to have another look at the Comet, which he considers "is far ahead of any existing American equipment."

CIVIL AVIATION . . .

A second survey flight over the new T.E.A.L. route to Tahiti *via* Western Samoa and the Cook Islands was made on September 6th from Suva. The aircraft—a Catalina commanded by Capt. C. J. Le Couteur—was due to spend three days at Apia, one at Aitutaki, and five days at Papeete, arriving back in Auckland on September 22nd. When regular services begin they will be operated mainly by the company's fifth Solent, R.M.A. *Aparima*, which arrived at Auckland recently after making a delivery flight from the United Kingdom.

* * *

The Czechoslovak Government has sent notes to the Allied High Commission in Germany and to the French Government protesting against the recent ban on all Czech air services flying across Western German territory. It is understood that the ban will remain in force until the Czech authorities release from prison an American newspaper correspondent.

* * *

The latest airline to become an active member of I.A.T.A. is Divisao de Exploraçao dos Transportes Aereos, which operates out of Luanda, Angola, in Portuguese West Africa. D.T.A. is a companion company of D.E.T.A., which operates from Lourenço Marques (Mozambique) and is also an I.A.T.A. member. Following the amalgamation of the Greek companies T.A.E. and Hellas, active membership in I.A.T.A. is being continued in the name of National Greek Airlines (T.A.E.). The Association's membership now totals 62 companies, of which 58 are active members and four are associates.

* * *

In order to keep pace with expanding traffic on their London routes and other new services, Q.E.A. have ordered a Super-Constellation. It is thought that this aircraft may be used for a non-stop Sydney-Singapore service carrying 50 passengers.

* * *

The heads of civil aviation authorities from 14 European countries met in London last week to discuss their mutual problems. The meetings are actually part of a series, the first of which took place at The Hague in October, 1950. They are designed to enable senior European aviation officials to establish personal contact and discuss matters of common interest in an informal atmosphere.

* * *

The M.C.A. has now altered the requirements for the renewal of Airline Transport Pilots' Licences, bringing them into line with those for the Commercial and Senior Commercial licences. With effect from October 1st, time flown as second pilot will no longer be accepted for the renewal of Group 1 ratings. The applicant will be required to show evidence of six hours' flying as pilot-in-charge during the six months immediately preceding the application. In addition, for a type of aircraft to be retained in Group 1, evidence must be shown that the applicant has made at least one flight as pilot-in-charge on that type during the preceding twelve months.

FROM THE CLUBS

A SUCCESSFUL tea patrol was flown on Saturday, September 8th, at Elstree airfield, the home of the Elstree Flying Club. Of the attacking aircraft only four managed to get in without having their registration letters taken, and thus qualified for a free tea.

Local clubs supported in strength, and the aircraft park produced evidence of visitors from Luton, Denham, White Waltham, Panshanger and Broxbourne, to mention but a few. The arrival competition was won by an Auster-mounted member of the Herts and Essex Aero Club, the prize—a bottle of whisky—being presented to him by Mr. Best-Devereaux, Elstree's secretary.

Early in the afternoon some 200 spectators saw an excellent display of gliding by Mr. Geoffrey Stevenson in his Olympia. The grace and precision with which his aerobatic manœuvres were executed left nothing to be desired, although his "zero-feet" loops seemed to cause some consternation to those directly beneath him. Miss Phyllis Weir was to have made a parachute descent, but her contribution had to be cancelled at the last minute because of a high wind. A number of club pilots braved it, however, in order to entertain the spectators with a balloon-bursting competition; they were able to score a creditable number "destroyed" and several " probables".

Informal afternoon events such as these provide an excellent opportunity for neighbouring club members and their friends to get together for a friendly chat and a drink, and it is to be hoped that an even larger number of clubs will organize similar occasions in the next flying season.

WE learn that a number of private flying enthusiasts in the Bahamas have banded themselves together to form the Nassau Flying Club. Within four weeks of its inception the Club has enrolled over 50 members and has also purchased its first aircraft —a two-seat Luscombe Silvaire powered by a 65 h.p. Continental engine.

The chairman of the club is G/C. E. L. Mole, who, it will be recalled, was chairman of the Ultra-Light Aircraft Association before taking up an appointment as Director of Civil Aviation in the Bahamas. The C.F.I. is Capt. Colyn Rees, who is well known in local flying circles. He has been carrying out free-lance flying instruction in the Bahamas for the past few years. The deputy C.F.I. is Capt. Philip Farrington, a Bahamas Airways pilot, who has flown over 2,000 hours as an elementary flying instructor with the R.A.F. during the war. Several assistant instructors are also being selected from experienced local pilots who have volunteered their services.

To help maintain their aircraft the club has arranged to use the part-time services of a local licensed ground engineer.

The club is fortunate also in having the full support of the Bahamas Government, who have granted the lease of a building at Oakes Field for use as a club-house at the nominal rent of one shilling per annum, and have waived all hangar and landing fees on club aircraft. Because of such enlightened support, the club is able to offer flying at the extremely reasonable rate of 30s per hour.

The Silvaire is already operating to peak capacity, and the purchase of another machine is being considered. A group of members is planning to form a floatplane section which, it is thought, should prove popular in view of the many attractive beaches which can be visited throughout the Bahamas islands. With the great advantage of perfect flying weather which the islands enjoy practically the whole year round a successful future for the club seems assured.

Incidentally, the officials say they will be delighted to welcome any members of British flying clubs, or other enthusiasts, who may be visiting the Bahamas. The address is the Nassau Flying Club, Oakes Field, Nassau.

A DAWN PATROL has been organized by the Redhill Flying Club to take place on Sunday, September 30th. Aircraft from Redhill will defend an area within five miles of the centre of the airfield, and "attacking" aircraft are invited to try to penetrate these defences between 0900 hr and 0930 hr; they must fly at an altitude between 2,000ft and 1,000ft. Visiting aircraft must not enter the defence zone before 0900 hr, and any arriving after 0930 hr will be deemed to be non-competitors. The defending machines will observe no altitude limitations. Pilots are reminded also that a left-hand circuit is in force at Redhill. Prior notice of the numbers of intending visitors would be appreciated by the secretary of the club.

THE Wiltshire Flying Club has apparently been breaking records again. During the month of August, flying time amounted to 475 hr 25 min, which brings the total for 1951 to 1,879 hr 35 min. In one day alone, and a week-day at that, W.F.C. recorded over 28 hr flying. Seven A.T.C. cadets were allotted to the Club at the beginning of August and by the 21st six of them had already completed 30 hours' flying and obtained their Private Pilot's Licences. The seventh has gone solo and is expected to finish his course almost immediately.

Wiltshire's fleet has now been augmented by the addition of one Tiger Moth, G-AMKI; it now consists of five Moths and five Austers. By the middle of September the club hopes also to commission two further Moths.

ALTHOUGH operating only three Tiger Moths, the Strathtay Aero Club succeeded in logging over 226 hours during August, a particularly creditable figure when the adverse weather conditions during the month are considered.

Six A.T.C. cadets and two club members have successfuly completed a course of training and have qualified for their Private Pilot's Licences.

ON Saturday, September 8th, the Wolverhampton Aero Club, which has now acquired quite a reputation for organizing impromptu events of this nature, held a private rally to Le Touquet. A club member, Mr. A. Bellinger, who will be well known to many English visitors to Le Touquet, offered a fine trophy for competition amongst members in a sealed-time arrival contest.

In all, eight aircraft took off from Wolverhampton, carrying 28 members and their friends. On arrival the pilots and their crews were greeted by Mme. Sansard, wife of the president of the Le Touquet Aero Club. In the evening a gala dinner-dance was held in the Casanova Casino at which the trophy was presented to the winner, Mr. D. J. Jemmett, who is well known as a racing pilot in this country.

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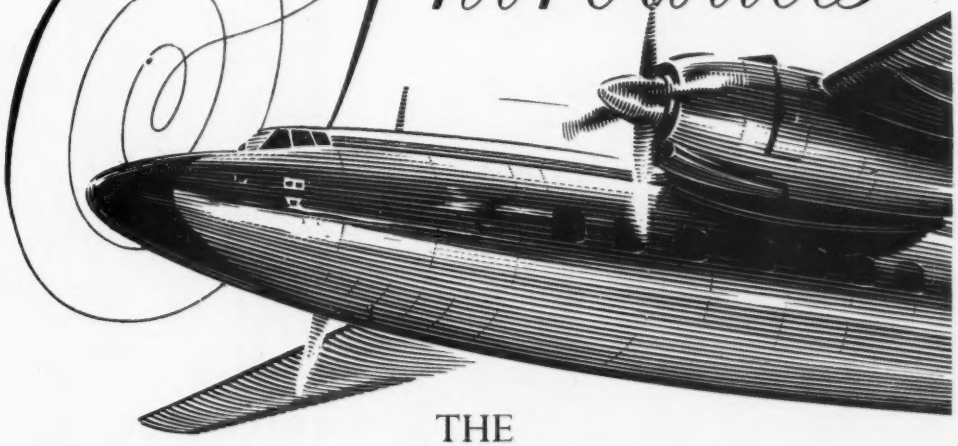

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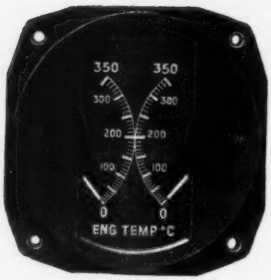

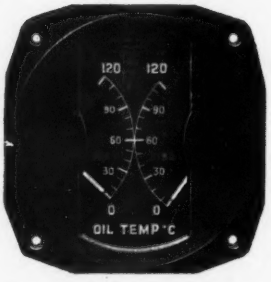

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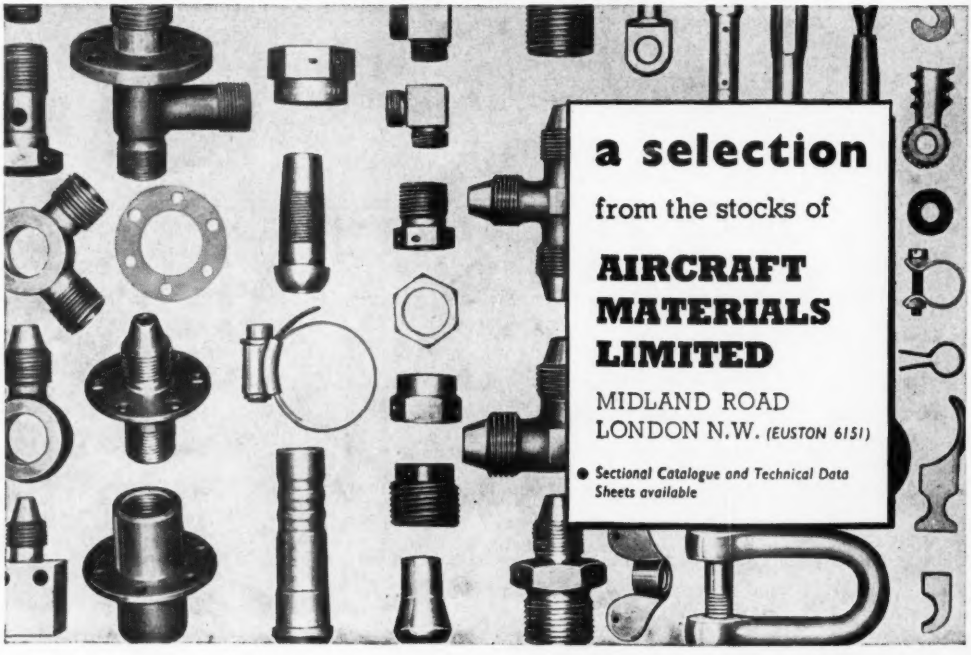

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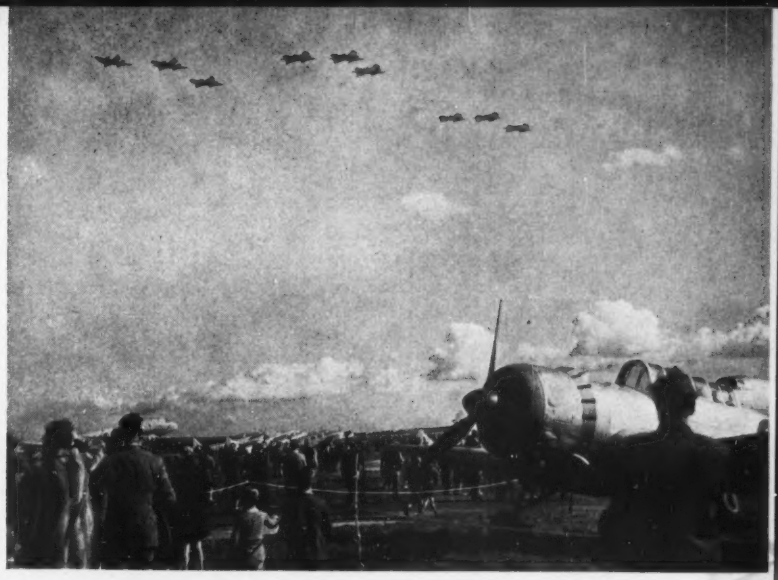


ONE OF 66: This scene at Leuchars, Fife, is typical, except for weather, of that at many of the 66 R.A.F. stations open to the public on Battle of Britain Day.

Battle of Britain Day

THE eleventh anniversary of the Royal Air Force's great air battle in the closing months of 1940 was marked last Saturday by the opening of 66 stations to the general public and a thanksgiving service at Westminster Abbey.

Weather over the British Isles varied considerably. Parts of Scotland were bathed in autumn sunshine—reminiscent of the actual days of the Battle of Britain—but most of England and Wales suffered from teeming rain. For the second year in succession the fly-past over London was cancelled. It was to have been led once more by the traditional lone Hurricane. The bad weather also affected the attendances and flying displays at stations "at home" to the public. Three hundred and seventy-eight thousand braved the elements compared with 705,000 in 1950. There were, however, some quite big attendances. At Castle Bromwich, Birmingham, where the Secretary of State for Air, Mr. Arthur Henderson, watched the display, there was a crowd of over 70,000. Yeadon, near Leeds, had 50,000 visitors, Biggin Hill 15,000 and Leuchars, Fifeshire, 13,000. R.A.F. Station, Hawarden, Flintshire, struck a new note. To satisfy the youthful element's desire for souvenirs an old Harvard was provided—complete with tools to hack it to pieces!

Unfortunately, there was also a sadder side to the day. Accidents occurred at Waterbeach, Cambridge, Thornaby, N. Yorkshire, and St. Athan, Glamorgan, in which three pilots lost their lives.

The thanksgiving service in Westminster Abbey on Sunday was attended by the Prime Minister and Mrs. Attlee and many of the members of the Air Council, Army Council, War Office and A.A Command. The Air Officers Commanding-in-Chief who were not present were attending thanksgiving services elsewhere. Air Chief Marshal the Hon. Sir Ralph A. Cochrane represented the King, and by virtue of this honour was met at the Great West Door and conducted to his seat by Canon Donaldson, the Sub Dean.

The service occasioned great depth of feeling. Following the procession of church dignitaries the R.A.F. Ensign was carried in, a fleeting glimpse of sunshine spotlighting it as the colour party passed through the Screen into the Sanctuary. Here, as the Ensign was draped over the High Altar—a patch of pale blue in a surround of glistening gold—immediately the strident notes of a trumpet fanfare rang out.

The anthem was adapted from the words of John Milton:

Nothing is here for tears, nothing to wail,
Nothing but well and fair,
And what may quiet us in a death so noble . . .
Thither shall all the valiant youth resort,
And from his memory inflame their breasts
To matchless valour and adventures high.

For the theme of his sermon the Lord Bishop of Edinburgh, the Right Rev. K. C. H. Warner, D.S.O., M.A., at one time an R.A.F. chaplain, compared the crucifixion on Calvary and the Battle of Britain. Both, he said, had made victory possible over evil; but only by devotion in the ensuing battles could advantage be taken of the initial victory.

At the close of the sermon, the offerings were taken on behalf of the R.A.F. Benevolent Fund, the stewards walking up the floor of the Sanctuary to place their collection bags on the golden plates held by acolytes on the steps of the High Altar.

The service ended with the trumpeters sounding the call of the Royal Air Force, the Last Post and Reveille. The Ensign was then returned to the colour party and carried from the altar in slow ceremonial march.

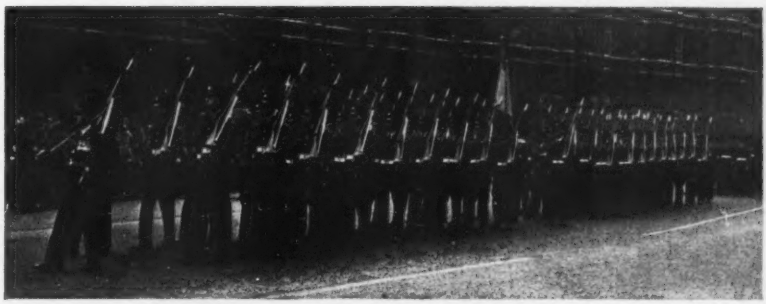
Malayan Operations

THE main air effort in Malaya during August was in the State of Johore, where 28 air strikes were made, followed by 19 strikes in the State of Perak and 14 strikes in Negri Sembilan. Six night strikes were made by Lincoln bombers of the R.A.A.F. The outstanding target of the month was a bandit camp in the Sitiawan area of the Federation of Malaya, which was hit by Brigands, Hornets and Vampires. Although the camp was in a difficult situation from the viewpoint of air attack, subsequent Auster A.O.P. reconnaissances showed it to have been completely destroyed. Supply-dropping aircraft, based at Kuala Lumpur and on Singapore Island, delivered nearly one hundred and twenty-six thousand pounds of supplies.

During the month no calls were received by the Helicopter Casualty Evacuation Flight to lift wounded men from jungle clearings.

R.N.Z.A.F. Vampires

THE first Vampires with which the Royal New Zealand Air Force is to be equipped are being assembled at Hobsonville air base, Auckland, and tested by



COLOUR ESCORT: The R.A.F. Ensign being marched from Westminster Abbey at the close of the Thanksgiving Service. The Ensign was carried by W/C. C. W. K. Nicholls with S/L. T. F. Neil on his right and Sgt. S. Hyams on his left.

"Flight" photograph

SERVICE AVIATION . . .

Brian Walker, test pilot for de Havillands in Australia. Mr. R. G. Burniston, who is Service representative of the parent company, has been in New Zealand for several months to supervise delivery of the new fighters.

F/L. L. A. Rayner, D.F.C., who has been training in Britain since January, will command the first R.N.Z.A.F. Vampire squadron.

Imperial Defence College Course

THE R.A.F. officers selected to attend the 1952 course at the Imperial Defence College are :—

General Duties Branch.—A.Cdre. D. H. F. Barnett, D.F.C., A.D.C. Director of Operations (1), Air Ministry; G/C. C. Broughton, Deputy Director of Organisation (1), Air Ministry; G/C. R. C. M. Collard, D.S.O., D.F.C., H.Q. M.E.A.F.; G/C. M. L. Heath, O.B.E., S.A.L.O. with the United Kingdom Service Liaison Staff in New Zealand; G/C. W. C. Sheen, D.S.O., O.B.E., Commanding Officer, R.A.F. Station Binbrook, Lincs; G/C. E. S. Butler, O.B.E., H.Q., Bomber Command.

Technical Branch.—A. Cdre. J. D. Baker-Carr, C.B.E., A.F.C., Director of Armament Research Development, Ministry of Supply.

Equipment Branch.—G/C. H. H. Hilliar, C.B.E., Commanding Officer, No. 16 Maintenance Unit.

"Man takes Wings"

FOR its 21st anniversary festival, held at the Royal Albert Hall on Sunday, September 9th, the R.A.F.A. depicted in pageant form the conquest of the air through the ages—from Daedalus and Icarus to the delta-winged aircraft of the present day. All the actors were amateurs and, under the direction of Jack Edwardes, the publicity and entertainments officer, had obviously put in a lot of hard work. They could not, for all their enthusiasm, overcome the physical drawbacks of performing at the Albert Hall. Inevitably, even the more populous scenes gave the appearance of odd people wandering about in a desert of planking and the great Leonardo da Vinci himself would have been hard put to it to stroll with dignity down the double-depth steps leading to the stage.

FIGHTING COCKS ON SHOW : The aerobatic team of No. 43 (Fighter) Squadron which performed at the International Air Display at Cannes, France. The pilots, left to right, are : Sgt. W. G. R. Johnstone, F/L. F. W. Lister, F/L. E. G. Wingham (leader), F/O. M. G. Beavis, and Sgt. A. Webster.

The parade of branch standards and the singing by the R.A.F.A. Choir (S.E. Area), conducted by Prof. Pett, attained the usual high pitch of perfection. Contingents from the flying units of all three Services helped to lend colour to the final scene and in this setting the commemoration service, conducted by the Rev. N. F. Porter, Assistant Chaplain - in - Chief, R.A.F., was most impressive.

Western Air Defence

AT the end of this month a three-day exercise, code-named "Cirrus," will test the integration of command and control of the air forces and anti-aircraft forces under Gen. Eisenhower in western Europe.

Units from the British, United States, Norwegian, French, Belgian, Dutch, Danish and Italian air forces will all take part. One of the most important features of the exercise will be the handing over of fighter units from one defending air force to another.

"Glory's" Korea Record

ON the last day of operations, before returning to harbour on September 10th, H.M.S. *Glory* had all her aircraft serviceable and, at one period, had them all in the air. A total of 84 sorties were flown. Every pilot and observer flew at least two sorties, while nine pilots and five observers each flew three. Fifty 500-lb bombs, 328 rockets and 15,000 rounds of 20 mm ammunition were expended.

At last light the *Glory's* American-manned helicopter successfully picked up Lts. Morris and Legg, the crew of a Firefly, which had been hit by anti-aircraft fire during a dive-bombing attack on a road bridge and had crash-landed in enemy territory. The helicopter ran out of fuel on the return journey and landed on a small island just off the Korean coast. H.M.C.S. *Sioux* took off the marooned pilot and observer and refuelled the helicopter.

R.A.F. Reserves Club Premises

THE Air Ministry having indicated its intention to support the efforts which R.A.F. Reserve Club members are making to secure H.Q. of their own, it should not be long before the Club ceases to be a lodger on R.N.V.R. Club premises. Donations, in either money or kind, are, of course, still urgently required.

Air Chief Marshal Sir Guy Garrod will preside at the club's third annual dinner, to be held in London on October 19th.

Reunions

A SECOND reunion for all ranks who served in Aden and outstations between 1939 and 1945 is to be held in London on January 26th, 1952. Details from W. Brackenbury, 3A, Rowan Road, London, S.W.16.

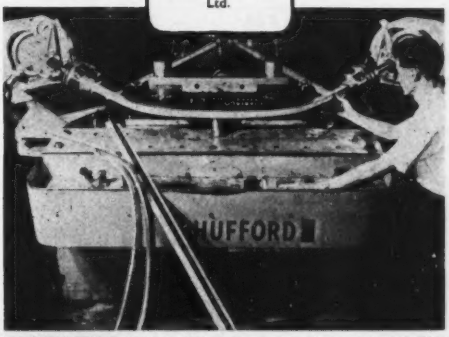
The 578 Burn Association is holding its seventh annual reunion at Selby on October 27th. Tickets (7s. 6d.) from Maurice Clark, 20, Chapelgate, Retford.

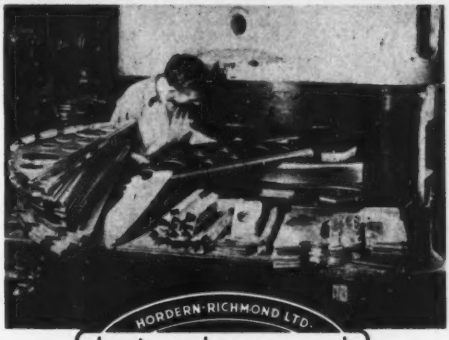
No. 236 Squadron, jointly with Nos. 143 and 254 Squadrons, will hold a reunion in London on November 3rd. H. L. Karby, 73, Lake Rise, Romford, Essex, has the details.

INSIDE STORY : Wren mechanics (airframe) being taught the intricacies of the Fairey Firefly's hydraulic system. Before qualifying, the girls attend a 20-week course at R.N.A.S., Yeovilton.

SERIAL 4

Hawker Sea Fury and Sea Hawk production. Photographs by courtesy of Hawker Aircraft Ltd.





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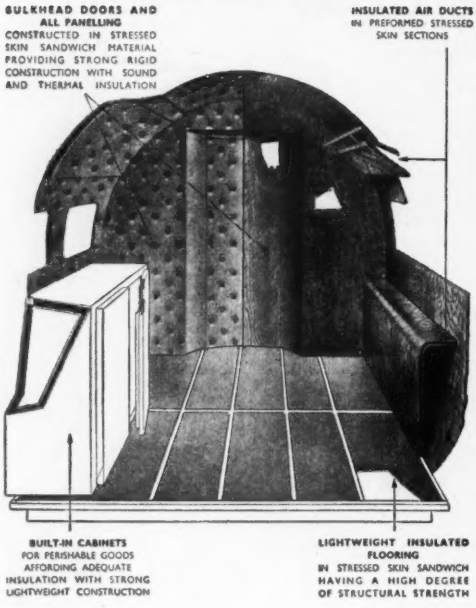
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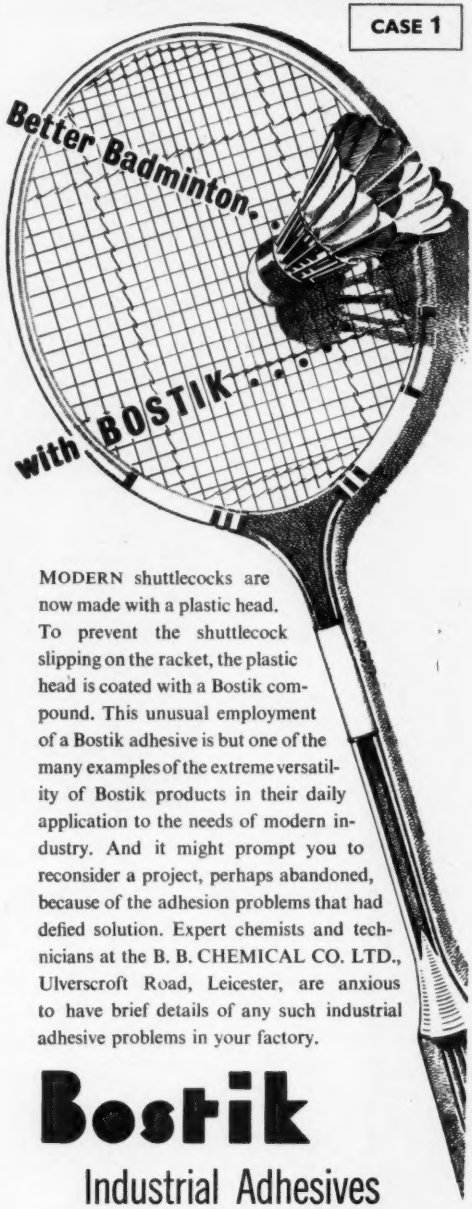

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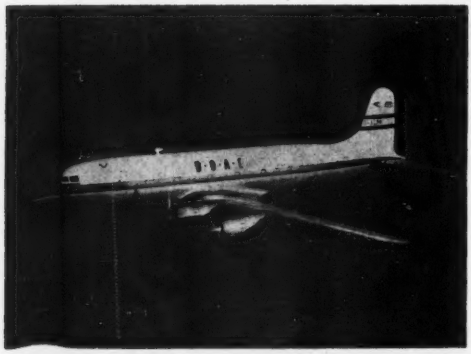

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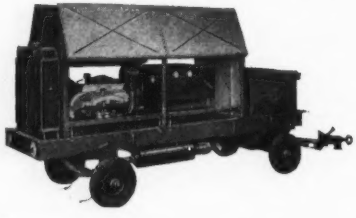

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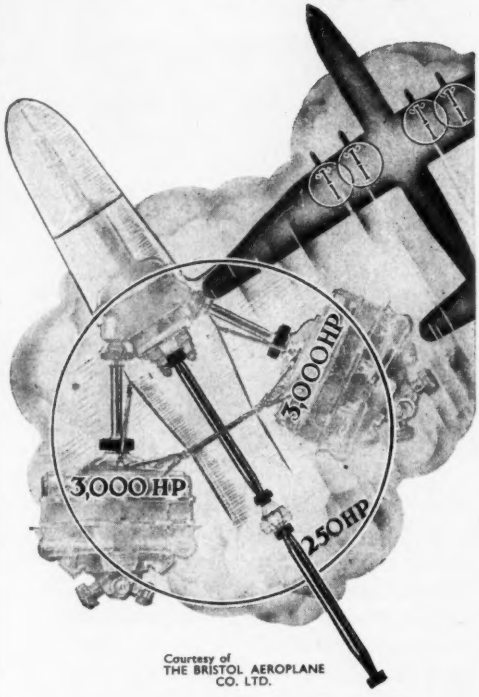

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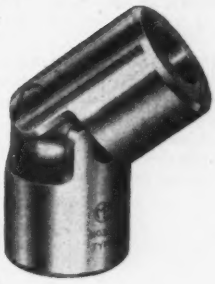

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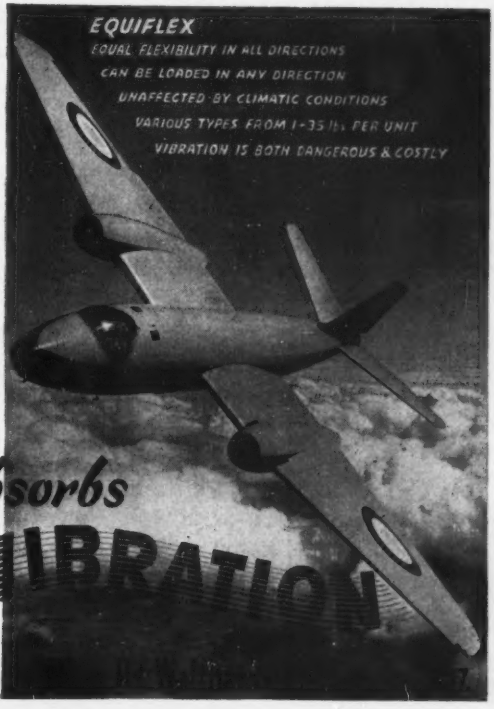

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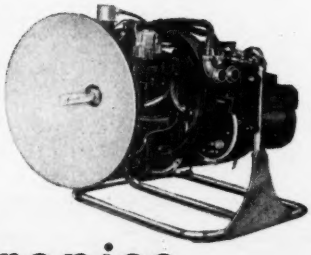

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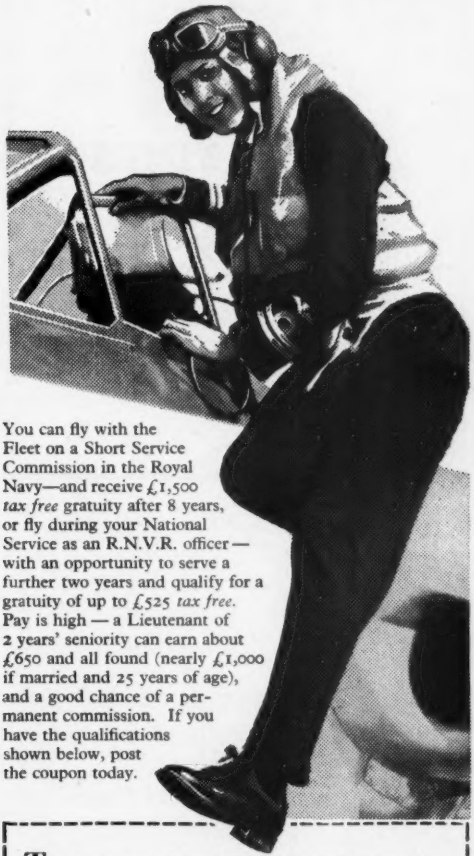

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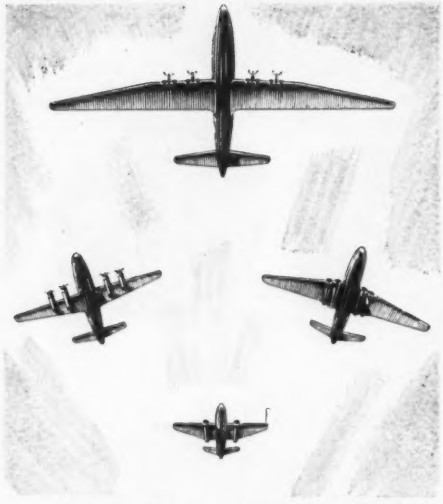

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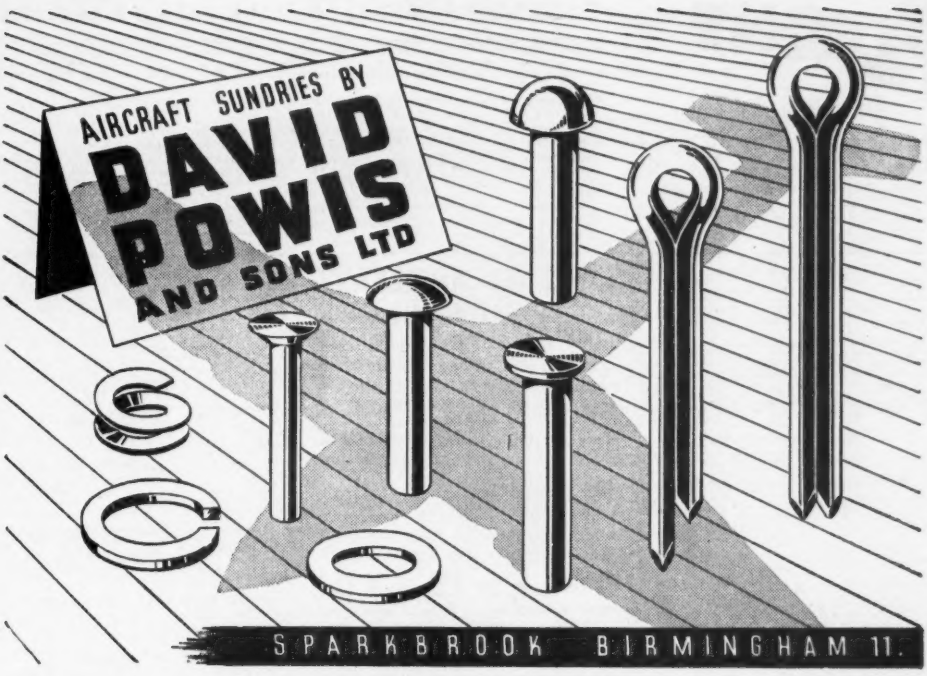

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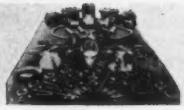

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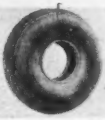

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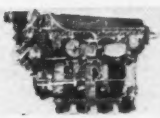

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MARSHALL'S FLYING SCHOOL OF CAMBRIDGE. M.C.C.A. approved courses (30 hours) for the private pilot's licence on Tiger Moth or Auster aircraft at £3 per hour; flying training for the commercial pilots' licence and instructor's endorsement; aircraft also available for aerial photography and air charter; no entrance fees or subscriptions.—The Airport, Cambridge. Tel. 56291 (ext. 3). [0568

COLLEGE OF AERONAUTICAL & AUTOMOBILE ENGINEERING, Chelsea and Redhill Aerodrome. Diploma courses in aeronautical engineering combine full day workshop and technical training with coaching for R.Ae.S. Associate Fellowship examination, Parts 1 and 2; aircraft engineers' licences, etc., in preparation for executive positions. Next term 3rd October.—Syllabus from the College Secretary, Sydney Street, Chelsea, S.W.3. Flaxman 0021. [0019

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METEOROLOGICAL assistants required for service in the Antarctic with the Falkland Islands Dependencies Survey for a tour of 18 to 30 months in the first instance. Salary between £325 and £375 a year according to qualifications and experience. £50 duty allowance. Free quarters, subsistence, clothing and routine canteen stores provided. Free passages. Liberal leave on full salary. Candidates, preferably over 25, must have had good experience of observing and of routine climatological returns.

APPLY at once, by letter, stating age, full names in block letters, and full particulars of qualifications and experience, and mentioning this paper, to the Crown Agents for the Colonies, 4, Millbank, London, S.W.1, quoting M.2775/6.E. on both letter and envelope. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. [6923

SUDAN GOVERNMENT

THE Survey Department requires a superintendent, aged 27 to 35, to supervise the drawing office of the new air survey sub-section. Duties will include indexing of aerial photographs, plotting with slotted templates and fair drawings of maps. Candidates should have had secondary education up to higher certificate standard with mathematics and at least 8 years' practical experience as cartographic draughtsmen. A sound knowledge of air survey methods required but stereo-comparator and multiplex experience not essential. Appointment will be on probation for short-term contract, with bonus, up to 5 years, salary applicable is £E.700 to £E.1,038 unless efficiency bar is passed at £E.771 or after when scale extended to £E.1,215. Starting salary according to age, qualifications and experience. Cost-of-living allowance varying between £E.142 and £E.352 per annum according to the number of dependants, is at present payable, and subject to certain limitations, an outfit allowance of £E.40 is payable on appointment. There is at present no income tax in the Sudan. Free passage on appointment.—Further particulars and application form may be obtained, on written application, from The Sudan Agent in London, Wellington House, Buckingham Gate, London, S.W.1. Please mark envelopes "Superintendent—Surveys 4/2102." [6932

HANDLEY PAGE, Ltd., have vacancies for:

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WIND tunnel technicians with 1st or 2nd class Hons. degree and with experience in or preference for wind tunnel work.

JUNIOR stressmen of degree standard. Experience preferred but not essential.

SENIOR design and intermediate draughtsmen, preferably with aircraft experience, for their Cricklewood and Radlett offices. Consideration will be given to applicants with experience in light structural or mechanical engineering. Possession of O.N.C. or H.N.C. (mech. or elect.) an advantage.

LOFTSMEN with previous experience in full-scale layout work or similar workshop practice. These vacancies are at Cricklewood only.

APPLICATIONS, stating age, qualifications and details of experience, to: Staff Officer, Handley Page, Ltd., Cricklewood, London, N.W.2. [6739

WESTLAND AIRCRAFT, Ltd., have vacancies for the following:

STRESSMEN (intermediate and senior).

DRAUGHTSMEN (intermediate and senior).

TECHNICAL ILLUSTRATORS.

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THE following staff are required for service in Karachi with an aircraft repair and overhaul company:—

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DEPUTY chief inspector, salary Rupees 1,400 per month.

A THREE-YEAR contract, with 4 months U.K. leave on conclusion.—Apply: Overseas Division, Airwork, Ltd., Sutton Lane, Langley Bucks. [6934

LICENSED aircraft radio engineer required immediately.—Apply to Chief Engineer, Eagle Aviation, Luton Airport, Beds. [0811

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CHIEF instructor wanted in October or November for Redhill Flying Club.—Applicants should send brief particulars to Redhill Flying Club, Redhill, Surrey. [6936

VICKERS-ARMSTRONGS, Ltd. (Aircraft Section) are shortly opening a design office at Hurn Airport and will be requiring the following staff:—

DRAUGHTSMEN (aircraft experience preferable but not essential).

AIRCRAFT stressmen.

APPLY, in writing, to the Employment Manager, Vickers-Armstrongs, Ltd. (Aircraft Section), Weybridge, Surrey. [6884

NORMALAIR, Ltd., Yeovil, invite applications from the following for work in connection with aircraft air conditioning, pressurizing, and high altitude breathing equipment:—

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BROOKLANDS AVIATION, Ltd., have vacancies for airframe and engine fitters, electricians for servicing and repair of R.A.F. aircraft. Good wages and piecework bonus.

APPLY: No. 4 Site, Sywell, Northants. [0308

FOLLAND AIRCRAFT, Ltd., require a senior weights engineer for interesting programme of work.—Apply: Personnel Manager, Folland Aircraft, Ltd., Hamble, Southampton. [6898

JIG and tool draughtsman required, fully experienced. —Applications, in writing, to Personnel Manager, Percival Aircraft, Ltd., Luton Airport, Beds, stating age, experience and salary required. [0593

WANTED, flight engineers for York aircraft. "A" and "C" to cover York aircraft essential.—Apply: Chief Engineer, Eagle Aviation, Ltd., Luton Airport, Luton, Beds. [0610

SENIOR jig and tool draughtsman wanted.—Apply, giving details of experience and qualifications to Personnel Officer, Westland Aircraft, Ltd., Yeovil, Somerset. [6880

JIG and tool draughtsmen required. Previous aircraft experience not essential. Pension and life assurance scheme.—Apply: Employment Manager, Vickers-Armstrongs (Aircraft Section), Weybridge. [6886

DRAUGHTSMEN required for commercial drawing office. Excellent prospects and interesting work.—Apply, Personnel Department, Vickers-Armstrongs, Ltd., South Marston, Swindon, Wilts. [6912

APPLICATIONS are invited from design draughtsmen and stressmen; also technical assistants with combined design and performance experience for work on both reciprocating and gas turbine aero engines.

APPLICATIONS should state full particulars of experience and qualifications and should be addressed to The Personnel Manager, The de Havilland Engine Co., Ltd., Stonegrove, Edgware, Middx. [0575

QUALIFIED photographer wanted, used to industrial photography and photographic processes.—Write, giving details of experience and qualifications, to Personnel Officer, Westland Aircraft, Ltd., Yeovil, Somerset. [6851

SCHEDULE clerks required (male) with experience in compiling M.o.S. spares schedules.—Applications, in writing, stating age, experience and salary required, to Personnel Manager, Percival Aircraft, Ltd., The Airport, Luton, Beds. [0596

TECHNICAL authors and illustrators required. Knowledge of M.o.S. procedure desirable.—Applications in writing, stating age, experience and salary required, to Personnel Manager, Percival Aircraft, Ltd., Luton Airport, Beds. [0594

MECHANICAL, structural or general engineering draughtsmen wanted for aircraft work. Previous aircraft experience not essential. Pension and life assurance scheme.—Apply, Employment Manager, Vickers-Armstrongs, Ltd. (Aircraft Section), Weybridge. [6920

GLOSTER AIRCRAFT Co., Ltd., have vacancies for fully experienced aircraft structural and electrical draughtsmen.—Applications, in writing, stating age, experience and salary required, to Employment Officer, G.A.C., Ltd., Hucclecote, Glos. [0910

SENIOR and junior weight engineers required. Interesting work on new projects. Permanent positions offered to suitable applicants.—Apply, stating age, experience, qualifications and salary required, to Chief Designer, Gloster Aircraft Co., Ltd., Witcombe, Glos. [0912

PLANNING engineers for gas turbine assembly and test required. Good salaries and prospects for suitable applicants. 5-day 39-hour week. Superannuation scheme. —Apply, giving details of previous experience and salary required, to Box 3917. [6909

TECHNICAL author required to prepare service manuals and instructions book for aeroplane landing gear and hydraulic equipment. Youth and comparative inexperience not a disadvantage if compensated by interest and ability to write reasonable prose.

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H. M. HOBSON, Ltd., invite applications for positions in the drawing office as follows: designers, detail and modification draughtsmen, checkers, stressmen. The work is concerned with interesting projects connected with fuel metering equipment and hydraulic flying controls for aircraft.—Hobson Works, Fordhouses, Wolverhampton. [0420

APPLICATIONS are invited from senior and intermediate design draughtsmen; experience of aero engine design desirable but not essential. Please write, stating age and giving details of previous experience in chronological order, to the Personnel Officer, The de Havilland Engine Co., Ltd., Stag Lane, Edgware, Middlesex. [0449

AIRCRAFT fitter assemblers required by de Havilland Aircraft Co., Hatfield, offering good working conditions, modern equipment, opportunities for advancement. Superannuation scheme, sports club, etc. Apply by telephone: Hatfield 2345, in person, or by letter addressed to Personnel Manager. [0630

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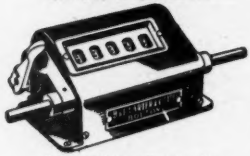

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INTERNATIONAL AERADIO, Ltd., require ground radio operators overseas. Candidates preferably licensed should have experience air radio operating and D/F work. Pension fund, good salary and allowance, tax free.—Write, quoting GRO, Senior Admin. Officer, 40, Park Street, London, W.1. [6918

PRESS tool designers are required by large engineering company in the Southampton area. Applications are invited from men with the necessary tool room and draughting experience. High salary and good prospects for men with required ability.—Write Box 1874, A. K. Advg., 212a, Shaftesbury Avenue, W.C.2. [6945

PLANNING engineers (aircraft) required. Considerable production planning experience and sound knowledge of metal airframe components manufacture essential.—Applications, in writing, to Personnel Manager, Percival Aircraft, Ltd., Luton Airport, Beds, stating age, experience and salary required. [6931

DEVELOPMENT engineers are required in London to work on aero and marine engines. Candidates must possess a degree or A.M.I.Mech.E. An attractive salary will be paid to suitably qualified men.—Write, stating age, experience and approximate salary, and mentioning Ref. H.G.C., to Box 4008. [6921

THERE are still some vacancies for senior aerodynamicists, and senior and junior stressmen in the Saunders-Roe design organization. Men of suitable ability and qualifications are invited to apply, stating experience, qualifications, age and salary expected, to the Personnel Officer, East Cowes, I.O.W. [6887

TECHNICAL assistants required, experience of aero engine development testing and reporting an advantage. 5-day week, good canteen facilities. — Please write, giving age and full details of previous experience, to the Personnel Officer, The de Havilland Engine Co., Ltd., Stag Lane, Edgware, Middlesex. [6926

FLYING instructors will shortly be required for a proposed basic flying training school at Sywell. Applicants must have held a C.F.S. Category and be on the R.A.F. Reserve, or be prepared to join. Applications, stating age, qualifications and details of experience, should be made in writing to the Manager, Brooklands Aviation, Ltd., Sywell Aerodrome, Northants. [6886

PLANNING engineers required immediately for machine shop, metal detail fitting, and assemblies. Applicants must have had previous practical experience, no others need apply.—Write, stating age, together with full particulars of previous employment, to the Personnel Manager, De Havilland Aircraft, Co., Ltd., Airspeed Division, The Airport, Portsmouth. [6939

DRAUGHTSMEN with experience in high quality light mechanical or hydraulic engineering are required by progressive Midland manufacturing company. Positions with good prospects are available to younger men. Salaries will be in accordance with age, qualifications and experience. State details, together with salary required, to Box 3825. [6890

A FIRST-CLASS designer is required to take charge of the London design office of a well-known firm producing aircraft equipment. Applicants must be fully conversant with general aircraft practice and experienced in the design of equipment embodying light precision engineering and instrument practice. Only first-class men need apply. Box 3701. [6850

BLACKBURN AND GENERAL AIRCRAFT, Ltd., have vacancies for assistants in their instrument laboratory for instrument calibration and repair work. Experience of this class of work and of A.R.B. requirements desirable although not essential.—Applications, giving particulars of age, training, experience, etc., to the Personnel Manager, Brough, E. Yorks. [6925

AIR FORCE, Naval, civil and helicopter aircraft all under design and development at Percival Aircraft, Ltd. Applications are invited from senior and junior draughtsmen, and stressmen, for work on this interesting programme. Write, giving details of experience and salary required, to Personnel Manager, Percival Aircraft, Ltd., Luton Airport, Luton, Beds. [6936

THE GLOSTER AIRCRAFT Co. requires senior and intermediate stressmen to work on designs and projects of advanced interest. Excellent prospects of advancement for sound and energetic men. Apply, in first instance, giving full particulars of technical qualifications, age, experience and salary required, to The Chief Designer, Gloster Aircraft Co., Ltd., Hucclecote, Glos. [6911

HANDLEY PAGE, Ltd., have vacancies for senior and junior technical assistants in their mechanical and structural test departments at Cricklewood and Radlett. Qualifications should include a degree or Higher National Certificate. Previous experience is desirable but not essential. Write, stating age, qualifications and details of experience, to Staff Officer, Handley Page, Ltd., Cricklewood, London, N.W.2. [6736

A VACANCY exists in the electronics section of the research department for an electronics engineer, preferably with a degree in mathematics, for the design of equipment for electronic measurement of physical variables and associated problems. Applications, stating age, qualifications, experience and salary required, should be addressed to the Personnel Officer, Westland Aircraft, Ltd., Yeovil, Somerset. [6846

ELECTRICIANS with aircraft or component experience required. Rates of pay 2/10 per hour plus 4d. per hour provisional bonus. Attractive proficiency pay up to 3d. per hour. Five-day, 44-hour week. Possible shift work. Good pension, sick pay, holiday and canteen facilities.—Write or call Staff Manager, British Overseas Airways Corporation, Hut 26, London Airport, Feltham, Middlesex. [6928A

JUNIOR technical assistants required for test work in connection with recording and analysing the performance data of development gas turbine engines. Good salaries and prospects to suitable applicants. Good canteen facilities. 5-day week.—Write, giving age, full details of previous experience and salary required to The Personnel Officer, The de Havilland Engine Co., Ltd., Hatfield Aerodrome, Hatfield, Herts. [6927

THE GLOSTER AIRCRAFT Co. requires the services of a number of aerodynamicists, (a) for design and project work, and (b) for flight test reduction. Opportunity exists for individuals to vary their experience within the Aerodynamics Departments. Candidates with some years' experience preferred, but applications from juniors with sound mathematical ability will receive full consideration. —Apply, in the first instance, giving full particulars of age, experience and salary required, to The Chief Designer, Gloster Aircraft Co., Ltd., Hucclecote, Glos. [6913

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EAGLE AVIATION, Ltd., invites ex-radio officers to return to the aviation industry and offers a training scheme which includes a subsistence allowance and payment of all fees to holders of the provisional licence who have had approximately 1,000 hours civil experience but who have not taken the examination for the first class licence.—Write for full details to Eagle Aviation, Ltd., Luton Airport, Luton, stating past experience. [6919

APPLICATIONS are invited for the responsible position of flight engineer for guided missiles. Applicant should be of degree standard and have practical experience of mechanical and electrical installations. Knowledge of telemetry and servo mechanisms is desirable, though not essential. North London district.—Write full details, qualifications, experience, age, salary sought, to Box A.C.65690, Samson Clarks, 57-61, Mortimer Street, W.1. [6930

A WELL-KNOWN North London aeroplane firm requires young technicians for development work on hydraulic, pneumatic components. Applicants should have A.M.I.Mech.E. or a degree and have had some practical experience. The work is of national importance and interesting. Good salaries are available to suitable applicants.—Write full details, qualifications, experience, age, salary sought, to Box AC65696, Samson Clarks, 57-61, Mortimer Street, W.1. [6931

SERVICE engineers, experienced, required. Good knowledge of all maintenance and overhaul of gas turbine engines essential. Opportunities of rewarding staff status for applicants having required technical background, education and experience. Also required, technical assistants, aged 24 and upwards, for Service Department duties. Must be able to deal with correspondence, compile technical records, etc., without supervision. Apply, the Personnel Officer, the de Havilland Engine Co., Ltd., Leavesden Aerodrome, nr. Watford, Herts. [6576

NORMALAIR, Ltd., invite applications from designers and draughtsmen for work on their London office in connection with aircraft air-conditioning, pressurizing and high altitude breathing equipment. Experience of aircraft equipment or delicate precision mechanisms is essential; only first-class qualified men will be considered. Applications, stating age, experience, qualifications and salary required, should, in the first instance, be addressed to the Personnel Officer, Normalair, Ltd., Yeovil, Somerset. [6845

SENIOR technician (female) required to take charge of small computing section operating electrical calculators, carrying out calculations for an aircraft design technical office. Applicants should have a knowledge of applied mathematics to, at least, engineering degree work; and ability to supervise. Salary according to experience and qualifications.—Applications should be addressed to: The Personnel Manager, the Bristol Aeroplane Co., Ltd. (Aircraft Division), Filton House, Bristol. [6911

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BRITISH EUROPEAN AIRWAYS have vacancies for pilots, with at least a commercial pilot's licence. (a) Pilots aged under 35 for a normal engagement, which includes membership of the pension scheme. Commencing salary between £815-£95 p.a., according to qualifications and experience. (b) Pilots aged 35 and over for a temporary appointment of two years, with the possibility of extension. Commencing salary between £815-£1,305 p.a., according to qualifications and experience. Such pilots will not be eligible for the pension scheme, but will receive a gratuity of £300 for each year of service on expiry of appointment.—Requests for application forms by postcard to Personnel Officer, Flight Operations Department, B.E.A., Ruislip, Middlesex. [6900

(a) Flight engineer required for aero-engine test work. (b) Technical assistant for employment in flight-test office on flight performance analysis of aero engines and installations. Must have reached Higher National Certificate standard in appropriate subjects and preferably with society fellowship of Aeronautical Society. Experience as technical flight observer essential. (c) Junior technical assistant for employment on technical flight observer duties and aero engine and installation flight department work. Preferably if achieved Higher National Certificate standard. Some previous flight experience desirable. Location Bedfordshire.—Write, giving details of age, experience and salary required, to Box 4046, quoting Ref. B.S. [6937

(a) of structural test laboratory, ordering and maintenance of testing equipment, and material, manufacture of test rigs. Must have some years practical experience of aircraft structure testing and be capable of taking some administrative responsibility. Higher National standard in engineering. Salary according to experience and qualifications. Assistance with accommodation can probably be arranged for suitable applicant. (b) Technical assistant for material test laboratory to take charge of material testing in accordance with British Standard specifications. (c) Stress analyst, degree standard, to analyse strain gauge test results for comparison of calculated stresses with actual stress distributions. Location Bedfordshire.—Apply, giving full particulars of age, experience and salary required, to Box 4047, quoting Ref. B.S. [6938

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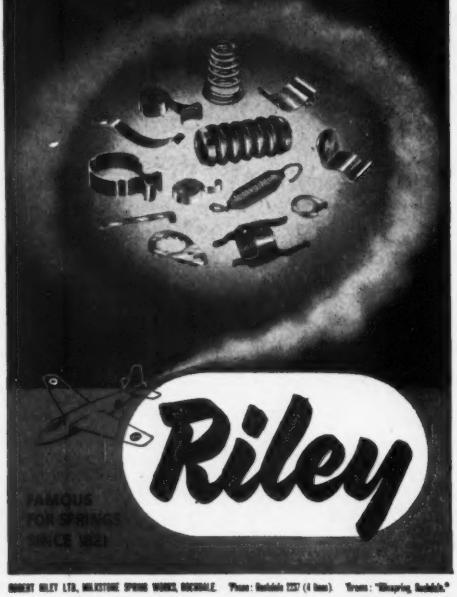

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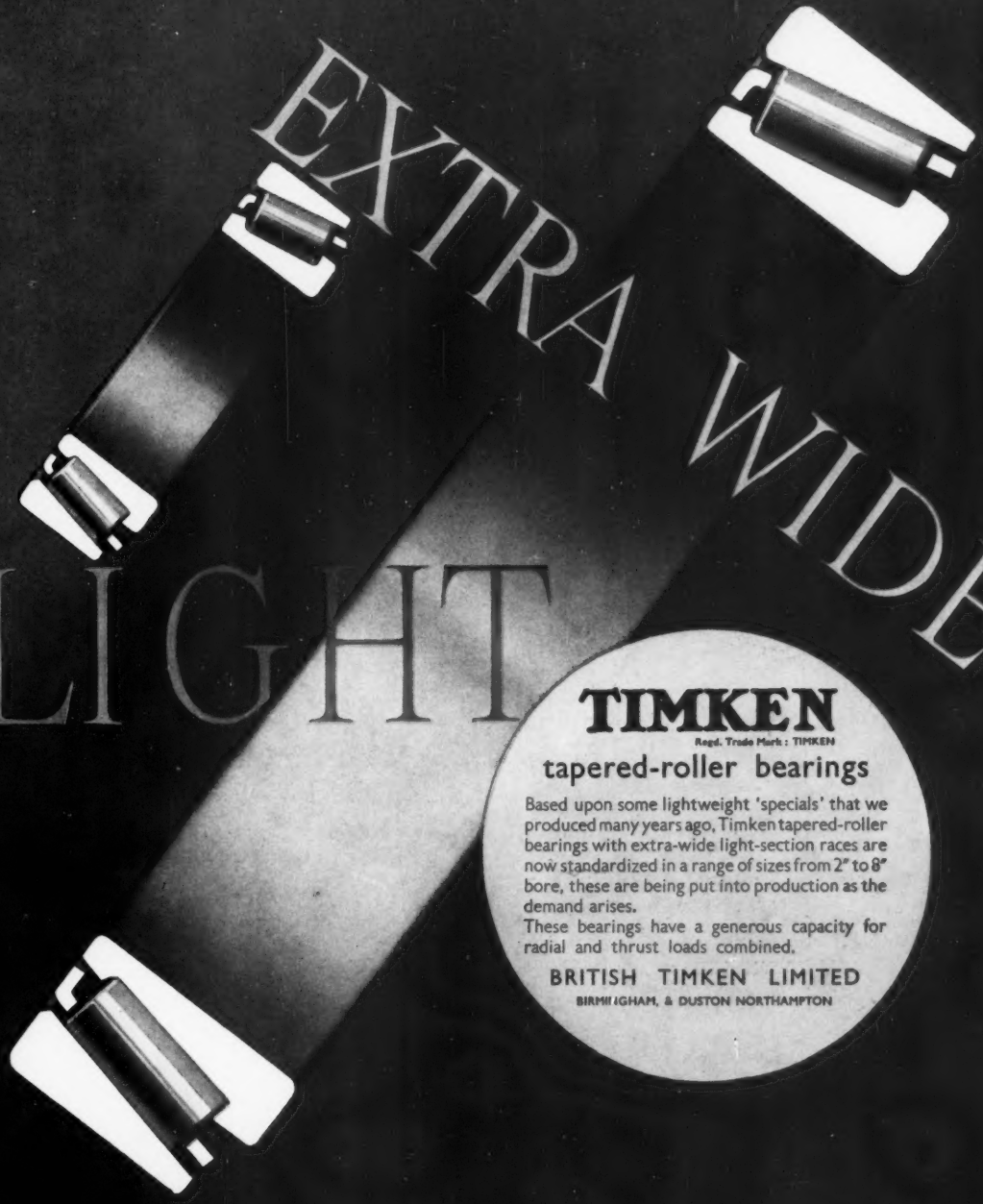

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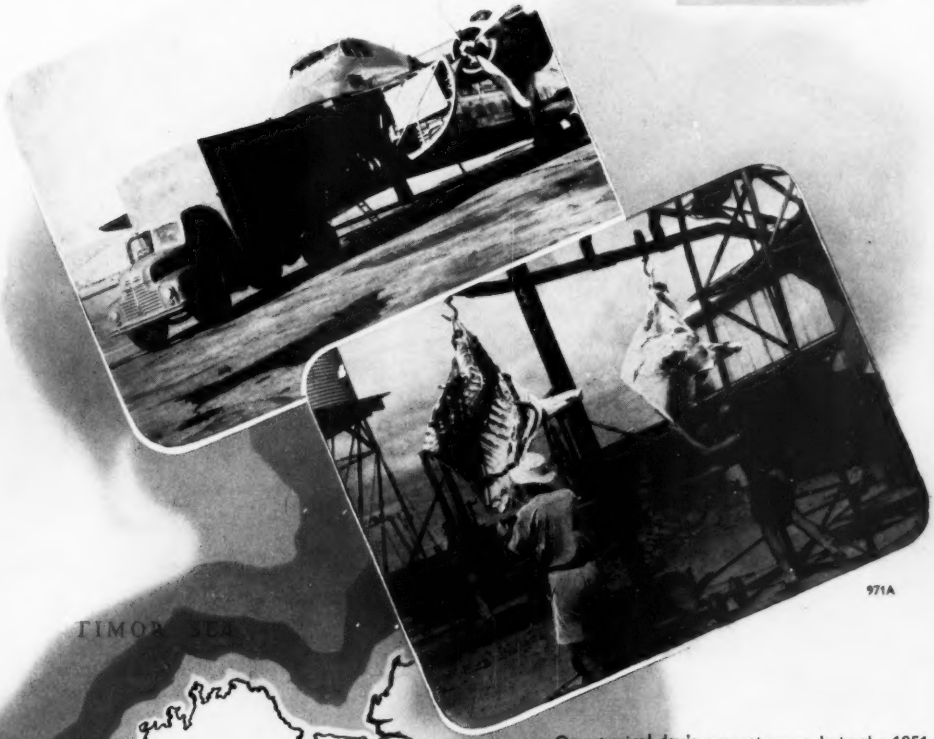

On a typical day's operations early in the 1951 Air Beef season, the "Bristol" Type 170 Freighter operating from the Glenroy abattoirs made two morning trips to Wyndham, carrying 30,000 lb. of beef, and two afternoon trips to Derby, with a further 28,700 lb. for trans-shipment to Perth. Now in its third season of operation, the Air Beef scheme works to an orderly and efficient routine. This day's work by the Freighter, during which it covered 1,387 miles and lifted four loads which few other aircraft could accommodate, is repeated five days a week throughout the five-months season . . . convincing evidence of the reliability and high degree of utilization achieved by the "Bristol" Type 170 and its "Bristol" Hercules engines.

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